

# SEQUENCE LISTING

<110> PRO-VIRUS, INC.

<120> ONCOLYTIC VIRUS

<130> 2370-62

<140> PCT/US00/25510

<141> 2000-09-18

<150> 09/397,873

<151> 1999-09-17

<160> 52

<170> PatentIn Ver. 2.1

<210> 1

<211> 11

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Synthetic peptide

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<210> 2

<211> 12

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Synthetic peptide

<400> 2

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<211> 11

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Synthetic peptide

<400> 3

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<210> 5  
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<210> 7  
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<210> 9  
<211> 1269  
<212> DNA  
<213> Vesicular stomatitis virus

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tccggaaatg tatcaatcat acatgtcaac agctacttgt atggagcatt aaaggacatc 240  
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<213> Vesicular stomatitis virus

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<210> 11

<211> 1269

<212> DNA

<213> Vesicular stomatitis virus

<400> 11

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<210> 12

<211> 1269

<212> DNA

<213> Vesicular stomatitis virus

<400> 12

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<210> 13  
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 <212> DNA  
 <213> Vesicular stomatitis virus

<220>  
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 <222> (1)..(1029)  
 <223> "n" represents a, t, c, g, other or unknown

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<210> 14  
 <211> 422  
 <212> PRT  
 <213> Vesicular stomatitis virus

<400> 14

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Arg	Lys	Ser	Lys	Glu	Ile	Pro	Leu	Tyr	Ile	Asn	Thr	Thr	Lys	Ser	Leu	
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Ser	Asp	Leu	Arg	Gly	Tyr	Val	Tyr	Gln	Gly	Leu	Lys	Ser	Gly	Asn	Val	
	50					55					60					
Ser	Ile	Ile	His	Val	Asn	Ser	Tyr	Leu	Tyr	Gly	Ala	Leu	Lys	Asp	Ile	
65					70					75					80	
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Lys	Ala	Gly	Asp	Thr	Ile	Gly	Ile	Phe	Asp	Leu	Val	Ser	Leu	Lys	Ala	
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Leu	Asp	Gly	Val	Leu	Pro	Asp	Gly	Val	Ser	Asp	Ala	Ser	Arg	Thr	Ser	
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Gly	Arg	Thr	Gln	Met	Pro	Glu	Tyr	Arg	Lys	Lys	Leu	Met	Asp	Gly	Leu	
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Glu	Gly	Arg	Asp	Ile	Phe	Asp	Val	Trp	Gly	Asn	Asp	Ser	Asn	Tyr	Thr	
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Lys	Ile	Val	Ala	Ala	Val	Asp	Met	Phe	Phe	His	Met	Phe	Lys	Lys	His	
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Glu	Cys	Ala	Ser	Phe	Arg	Tyr	Gly	Thr	Ile	Val	Ser	Arg	Phe	Lys	Asp	
	210					215					220					
Cys	Ala	Ala	Leu	Ala	Thr	Phe	Gly	His	Leu	Cys	Lys	Ile	Thr	Gly	Met	
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Glu	Met	Val	Gln	Met	Met	Leu	Pro	Gly	Gln	Glu	Ile	Asp	Lys	Ala	Asp	
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Ser	Tyr	Met	Pro	Tyr	Leu	Ile	Asp	Phe	Gly	Leu	Ser	Ser	Lys	Ser	Pro	
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Tyr	Ser	Ser	Val	Lys	Asn	Pro	Ala	Phe	His	Phe	Trp	Gly	Gln	Leu	Thr	
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 Asp Ile Glu Tyr Thr Ser Leu Thr Thr Ala Gly Leu Leu Tyr Ala Tyr  
 325 330 335  
 Ala Val Gly Ser Ser Ala Asp Leu Ala Gln Gln Phe Cys Val Gly Asp  
 340 345 350  
 Asn Lys Tyr Thr Pro Asp Asp Ser Thr Gly Gly Leu Thr Thr Asn Ala  
 355 360 365  
 Pro Pro Gln Gly Arg Asp Val Val Glu Trp Leu Gly Trp Phe Glu Asp  
 370 375 380  
 Gln Asn Arg Lys Pro Thr Pro Asp Met Met Gln Tyr Ala Lys Arg Ala  
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 Lys Ser Glu Phe Asp Lys  
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<210> 15  
 <211> 422  
 <212> PRT  
 <213> Vesicular stomatitis virus

<400> 15  
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 35 40 45  
 Ser Asp Leu Arg Gly Tyr Val Tyr Gln Gly Leu Lys Ser Gly Asn Val  
 50 55 60  
 Ser Ile Ile His Val Asn Ser Tyr Leu Tyr Gly Ala Leu Lys Asp Ile  
 65 70 75 80  
 Arg Gly Lys Leu Asp Lys Asp Trp Ser Ser Phe Gly Ile Asn Ile Gly  
 85 90 95  
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<210> 16  
 <211> 422  
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<400> 16

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Arg	Lys	Ser	Lys	Glu	Ile	Pro	Leu	Tyr	Ile	Asn	Thr	Thr	Lys	Ser	Leu
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Ser	Asp	Leu	Arg	Gly	Tyr	Val	Tyr	Gln	Gly	Leu	Lys	Ser	Gly	Asn	Val
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Ser	Ile	Ile	His	Val	Asn	Ser	Tyr	Leu	Tyr	Gly	Ala	Leu	Lys	Asp	Ile
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Cys	Ala	Ala	Leu	Ala	Thr	Phe	Gly	His	Leu	Cys	Lys	Ile	Thr	Gly	Met
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Glu	Met	Val	Gln	Met	Met	Leu	Pro	Gly	Gln	Glu	Ile	Asp	Lys	Ala	Asp
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 Ser Lys Tyr Thr Pro Asp Asp Ser Thr Gly Gly Leu Thr Thr Asn Ala  
 355 360 365  
 Pro Pro Gln Gly Arg Asp Val Val Glu Trp Leu Gly Trp Phe Glu Asp  
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 Lys Ser Glu Phe Asp Lys  
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<210> 17  
 <211> 342  
 <212> PRT  
 <213> Vesicular stomatitis virus

<220>  
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 <222> (1)..(342)  
 <223> "Xaa" represents any, other or unknown amino acid

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 35 40 45  
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 50 55 60  
 Ala Asp Asp Lys Trp Leu Pro Leu Tyr Leu Leu Gly Leu Tyr Arg Val  
 65 70 75 80

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Glu	Gly	Arg	Asp	Ile	Phe	Asp	Val	Trp	Gly	Asn	Asp	Ser	Asn	Tyr	Thr	
				115					120					125		
Lys	Ile	Val	Ala	Ala	Val	Asp	Met	Phe	Phe	His	Met	Phe	Lys	Lys	His	
				130					135					140		
Glu	Cys	Ala	Ser	Phe	Arg	Tyr	Gly	Thr	Ile	Val	Ser	Arg	Phe	Lys	Asp	
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Ser	Thr	Glu	Asp	Val	Thr	Thr	Trp	Ile	Leu	Asn	Arg	Glu	Val	Ala	Asp	
				180					185					190		
Glu	Met	Val	Gln	Met	Met	Leu	Pro	Gly	Gln	Glu	Ile	Asp	Lys	Ala	Asp	
				195					200					205		
Ser	Tyr	Met	Pro	Tyr	Leu	Ile	Asp	Phe	Gly	Leu	Ser	Ser	Lys	Ser	Pro	
				210					215					220		
Tyr	Ser	Ser	Val	Lys	Asn	Pro	Ala	Phe	His	Phe	Trp	Gly	Gln	Leu	Thr	
225					230					235					240	
Asp	Ile	Glu	Tyr	Thr	Ser	Xaa	Thr	Thr	Ala	Gly	Leu	Leu	Tyr	Ala	Tyr	
				245					250					255		
Ala	Val	Gly	Ser	Ser	Ala	Asp	Leu	Ala	Xaa	Gln	Phe	Cys	Val	Gly	Asp	
				260					265					270		
Ser	Lys	Tyr	Thr	Pro	Asp	Asp	Ser	Thr	Gly	Gly	Leu	Thr	Thr	Asn	Ala	
				275					280					285		
Pro	Pro	Gln	Gly	Arg	Asp	Val	Val	Glu	Trp	Leu	Gly	Trp	Phe	Glu	Asp	
				290					295					300		
Gln	Asn	Arg	Lys	Pro	Thr	Pro	Asp	Met	Met	Gln	Tyr	Ala	Lys	Arg	Ala	
305					310					315					320	
Val	Met	Ser	Leu	Gln	Gly	Leu	Arg	Glu	Lys	Thr	Ile	Gly	Lys	Tyr	Ala	
				325					330					335		
Lys	Ser	Glu	Phe	Asp	Lys											
				340												

<210> 18  
 <211> 798  
 <212> DNA  
 <213> Vesicular stomatitis virus

<400> 18  
 atggataatc tcacaaaagt tcgtgagtat ctcaagtcct attctcgtct ggatcaggcg 60  
 gtaggagaga tagatgagat cgaagcacia cgagctgaaa agtccaatta tgagttgttc 120  
 caagaggatg gagtggaaga gcatactaag ccctcttatt ttcaggcagc agatgattct 180  
 gacacagaat ctgaaccaga aattgaagac aatcaagggt tgtatgcaca ggatccagaa 240  
 gctgagcaag ttgaaggctt tatacagggg ccttttagatg actatgcaga tgaggaagtg 300  
 gatgttgtat ttacttcgga ctggaaacca cctgagcttg aatctgacga gcatggaaaag 360  
 accttacggt tgacatcgcc agagggttta agtggagagc agaaatccca gtggctttcg 420  
 acgattaaag cagtcgtgca aagtgccaaa tactggaatc tggcagagtg cacatttgaa 480  
 gcatcgggag aaggggtcat tatgaaggag cgccagataa ctccggatgt atataaggtc 540  
 actccagtga tgaacacaca tccgtcccaa tcagaagcag tatcagatgt ttggtctctc 600  
 tcaaagacat ccatgacttt ccaacccaag aaagcaagtc ttcagcctct caccatatcc 660  
 ttggatgaat tgttctcatc tagaggagag ttcatctctg tcggaggtga cggacgaatg 720  
 tctcataaag aggccatcct gctcggcctg agatacaaaa agttgtacaa tcaggcgaga 780  
 gtcaaattatt ctctgtag 798

<210> 19  
 <211> 798  
 <212> DNA  
 <213> Vesicular stomatitis virus

<400> 19  
 atggataatc tcacaaaagt tcgtgagtat ctcaagtcct attctcgtct agatcaggcg 60  
 gtaggagaga tagatgagat cgaagcacia cgagctgaaa agtccaatta tgagttgttc 120  
 caagaggacg gagtggaaga gcatactagg ccctcttatt ttcaggcagc agatgattct 180  
 gacacagaat ctgaaccaga aattgaagac aatcaaggct tgtatgtacc agatccgga 240  
 gctgagcaag ttgaaggctt tatacagggg ccttttagatg actatgcgga tgaggacgtg 300  
 gatgttgtat tcacttcgga ctggaaacag cctgagcttg aatccgacga gcatggaaaag 360  
 accttacggt tgacattgcc agagggttta agtggagagc agaaatccca gtggcttttg 420  
 acgattaaag cagtcgttca aagtgccaaa cactggaatc tggcagagtg cacatttgaa 480  
 gcatcgggag aaggggtcat cataaaaaag cgccagataa ctccggatgt atataaggtc 540  
 actccagtga tgaacacaca tccgtcccaa tcagaagccg tatcagatgt ttggtctctc 600  
 tcaaagacat ccatgacttt ccaacccaag aaagcaagtc ttcagcctct caccatatcc 660  
 ttggatgaat tgttctcatc tagaggagaa ttcatctctg tcggaggtaa cggacgaatg 720  
 tctcataaag aggccatcct gctcggctctg aggtacaaaa agttgtacaa tcaggcgaga 780  
 gtcaaattatt ctctgtag 798

<210> 20  
 <211> 570  
 <212> DNA  
 <213> Vesicular stomatitis virus

<400> 20  
 atggataatc tcacaaaagt tcgtgagtat ctcaagtcct attctcgtct agatcaggcg 60  
 gtaggagaga tagatgagat cgaagcacia cgagctgaaa agtccaatta tgagttgttc 120  
 caagaggacg gagtggaaga gcatactagg ccctcttatt ttcaggcagc agatgattct 180  
 gacacagaat ctgaaccaga aattgaagac aatcaaggct tgtatgtacc agatccgga 240  
 gctgagcaag ttgaaggctt tatacagggg ccttttagatg actatgcgga tgaggacgtg 300  
 gatgttgtat tcacttcgga ctggaaacag cctgagcttg aatccgacga gcatggaaaag 360  
 accttacggt tgacattgcc agagggttta agtggagagc agaaatccca gtggcttttg 420

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acgattaaag cagtcgttca aagtgccaaa cactggaatc tggcagagtg cacatttgaa 480
gcatcgggag aaggggtcat cataaaaaag cgccagataa ctccggatgt atataaggtc 540
actccagtga tgaacacaca tccgtcccaa                    570

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<210> 21
<211> 798
<212> DNA
<213> Vesicular stomatitis virus

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<400> 21
atggataatc tcacaaaagt tcgtgagtat ctcaagtcct attctcgtct agatcaggcg 60
gtaggagaga tagatgagat cgaagcacia cgagctgaaa agtccaatta tgagttgttc 120
caagaggacg gagtggaaga gcatactagg ccctcttatt ttcaggcagc agatgattct 180
gacacagaat ctgaaccaga aattgaagac aatcaaggct tgtatgtacc agatccggaa 240
gctgagcaag ttgaaggctt tatacagggg ccttttagatg actatgcgga tgaggacgtg 300
gatgttgtat tcacttcgga ctggaaacag cctgagcttg aatccgacga gcatggaaaag 360
accttacggg tgacattgcc agagggttta agtggagagc agaaatccca gtggcttttg 420
acgattaaag cagtcgttca aagtgccaaa cactggaatc tggcagagtg cacatttgaa 480
gcatcgggag aaggggtcat cataaaaaag cgccagataa ctccggatgt atataaggtc 540
actccagtga tgaacacaca tccgtcccaa tcggaagccg tatcagatgt ttggtctctc 600
tcaaagacat ccatgacttt ccaacccaag aaagcaagtc ttcagcctct caccatatcc 660
ttggatgaat tgttctcatc tagaggagaa ttcattctctg tcggaggtaa cggacgaatg 720
tctcataaag aggccatcct gtcgggtctg aggtacaaaa agttgtacaa tcaggcgaga 780
gtcaaatatt ctctgtag                    798

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<210> 22
<211> 798
<212> DNA
<213> Vesicular stomatitis virus

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<400> 22
atggataatc tcacaaaagt tcgtgagtat ctcaagtcct attctcgtct agatcaggcg 60
gtaggagaga tagatgagat cgaagcacia cgagctgaaa agtccaatta tgagttgttc 120
caagaggacg gagtggaaga gcatactagg ccctcttatt ttcaggcagc agatgattct 180
gacacagaat ctgaaccaga aattgaagac aatcaaggct tgtatgtacc agatccggaa 240
gctgagcaag ttgaaggctt tatacagggg ccttttagatg actatgcgga tgaggacgtg 300
gatgttgtat tcacttcgga ctggaaacag cctgagcttg aatccgacga gcatggaaaag 360
accttacggg tgacattgcc agagggttta agtggagagc agaaatccca gtggcttttg 420
acgattaaag cagtcgttca aagtgccaaa cactggaatc tggcagagtg cacatttgaa 480
gcatcgggag aaggggtcat cataaaaaag cgccagataa ctccggatgt atataaggtc 540
actccagtga tgaacacaca tccgtcccaa tcagaagccg tatcagatgt ttggtctctc 600
tcaaagacat ccatgacttt ccaacccaag aaagcaagtc ttcagcctct caccatatcc 660
ttggatgaat tgttctcatc tagaggagaa ttcattctctg tcggaggtaa cggacgaatg 720
tctcataaag aggccatcct gtcgggtctg aggtacaaaa agttgtacaa tcaggcgaga 780
gtcaaatatt ctctgtag                    798

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<210> 23  
<211> 265  
<212> PRT  
<213> Vesicular stomatitis virus

<400> 23

Met	Asp	Asn	Leu	Thr	Lys	Val	Arg	Glu	Tyr	Leu	Lys	Ser	Tyr	Ser	Arg
1				5					10					15	
Leu	Asp	Gln	Ala	Val	Gly	Glu	Ile	Asp	Glu	Ile	Glu	Ala	Gln	Arg	Ala
			20					25					30		
Glu	Lys	Ser	Asn	Tyr	Glu	Leu	Phe	Gln	Glu	Asp	Gly	Val	Glu	Glu	His
		35					40					45			
Thr	Lys	Pro	Ser	Tyr	Phe	Gln	Ala	Ala	Asp	Asp	Ser	Asp	Thr	Glu	Ser
	50					55					60				
Glu	Pro	Glu	Ile	Glu	Asp	Asn	Gln	Gly	Leu	Tyr	Ala	Gln	Asp	Pro	Glu
65					70					75					80
Ala	Glu	Gln	Val	Glu	Gly	Phe	Ile	Gln	Gly	Pro	Leu	Asp	Asp	Tyr	Ala
				85					90					95	
Asp	Glu	Glu	Val	Asp	Val	Val	Phe	Thr	Ser	Asp	Trp	Lys	Pro	Pro	Glu
			100					105					110		
Leu	Glu	Ser	Asp	Glu	His	Gly	Lys	Thr	Leu	Arg	Leu	Thr	Ser	Pro	Glu
		115					120					125			
Gly	Leu	Ser	Gly	Glu	Gln	Lys	Ser	Gln	Trp	Leu	Ser	Thr	Ile	Lys	Ala
130						135					140				
Val	Val	Gln	Ser	Ala	Lys	Tyr	Trp	Asn	Leu	Ala	Glu	Cys	Thr	Phe	Glu
145					150					155					160
Ala	Ser	Gly	Glu	Gly	Val	Ile	Met	Lys	Glu	Arg	Gln	Ile	Thr	Pro	Asp
				165					170					175	
Val	Tyr	Lys	Val	Thr	Pro	Val	Met	Asn	Thr	His	Pro	Ser	Gln	Ser	Glu
		180						185					190		
Ala	Val	Ser	Asp	Val	Trp	Ser	Leu	Ser	Lys	Thr	Ser	Met	Thr	Phe	Gln
		195					200					205			
Pro	Lys	Lys	Ala	Ser	Leu	Gln	Pro	Leu	Thr	Ile	Ser	Leu	Asp	Glu	Leu
	210					215					220				
Phe	Ser	Ser	Arg	Gly	Glu	Phe	Ile	Ser	Val	Gly	Gly	Asp	Gly	Arg	Met
225					230					235					240
Ser	His	Lys	Glu	Ala	Ile	Leu	Leu	Gly	Leu	Arg	Tyr	Lys	Lys	Leu	Tyr
			245						250					255	
Asn	Gln	Ala	Arg	Val	Lys	Tyr	Ser	Leu							
			260					265							



<210> 24  
 <211> 265  
 <212> PRT  
 <213> Vesicular stomatitis virus

<400> 24

Met	Asp	Asn	Leu	Thr	Lys	Val	Arg	Glu	Tyr	Leu	Lys	Ser	Tyr	Ser	Arg
1				5					10					15	
Leu	Asp	Gln	Ala	Val	Gly	Glu	Ile	Asp	Glu	Ile	Glu	Ala	Gln	Arg	Ala
		20						25					30		
Glu	Lys	Ser	Asn	Tyr	Glu	Leu	Phe	Gln	Glu	Asp	Gly	Val	Glu	Glu	His
	35						40					45			
Thr	Arg	Pro	Ser	Tyr	Phe	Gln	Ala	Ala	Asp	Asp	Ser	Asp	Thr	Glu	Ser
	50					55					60				
Glu	Pro	Glu	Ile	Glu	Asp	Asn	Gln	Gly	Leu	Tyr	Val	Pro	Asp	Pro	Glu
65					70					75					80
Ala	Glu	Gln	Val	Glu	Gly	Phe	Ile	Gln	Gly	Pro	Leu	Asp	Asp	Tyr	Ala
				85					90					95	
Asp	Glu	Asp	Val	Asp	Val	Val	Phe	Thr	Ser	Asp	Trp	Lys	Gln	Pro	Glu
			100					105					110		
Leu	Glu	Ser	Asp	Glu	His	Gly	Lys	Thr	Leu	Arg	Leu	Thr	Leu	Pro	Glu
		115					120					125			
Gly	Leu	Ser	Gly	Glu	Gln	Lys	Ser	Gln	Trp	Leu	Leu	Thr	Ile	Lys	Ala
	130					135					140				
Val	Val	Gln	Ser	Ala	Lys	His	Trp	Asn	Leu	Ala	Glu	Cys	Thr	Phe	Glu
145					150					155					160
Ala	Ser	Gly	Glu	Gly	Val	Ile	Ile	Lys	Lys	Arg	Gln	Ile	Thr	Pro	Asp
				165					170					175	
Val	Tyr	Lys	Val	Thr	Pro	Val	Met	Asn	Thr	His	Pro	Ser	Gln	Ser	Glu
			180					185					190		
Ala	Val	Ser	Asp	Val	Trp	Ser	Leu	Ser	Lys	Thr	Ser	Met	Thr	Phe	Gln
		195					200					205			
Pro	Lys	Lys	Ala	Ser	Leu	Gln	Pro	Leu	Thr	Ile	Ser	Leu	Asp	Glu	Leu
	210					215					220				
Phe	Ser	Ser	Arg	Gly	Glu	Phe	Ile	Ser	Val	Gly	Gly	Asn	Gly	Arg	Met
225					230					235					240
Ser	His	Lys	Glu	Ala	Ile	Leu	Leu	Gly	Leu	Arg	Tyr	Lys	Lys	Leu	Tyr
			245						250					255	
Asn	Gln	Ala	Arg	Val	Lys	Tyr	Ser	Leu							
		260						265							



<210> 25  
<211> 190  
<212> PRT  
<213> Vesicular stomatitis virus

<400> 25

Met	Asp	Asn	Leu	Thr	Lys	Val	Arg	Glu	Tyr	Leu	Lys	Ser	Tyr	Ser	Arg
1				5					10					15	
Leu	Asp	Gln	Ala	Val	Gly	Glu	Ile	Asp	Glu	Ile	Glu	Ala	Gln	Arg	Ala
			20					25					30		
Glu	Lys	Ser	Asn	Tyr	Glu	Leu	Phe	Gln	Glu	Asp	Gly	Val	Glu	Glu	His
		35					40					45			
Thr	Arg	Pro	Ser	Tyr	Phe	Gln	Ala	Ala	Asp	Asp	Ser	Asp	Thr	Glu	Ser
	50					55					60				
Glu	Pro	Glu	Ile	Glu	Asp	Asn	Gln	Gly	Leu	Tyr	Val	Pro	Asp	Pro	Glu
65					70					75					80
Ala	Glu	Gln	Val	Glu	Gly	Phe	Ile	Gln	Gly	Pro	Leu	Asp	Asp	Tyr	Ala
				85					90					95	
Asp	Glu	Asp	Val	Asp	Val	Val	Phe	Thr	Ser	Asp	Trp	Lys	Gln	Pro	Glu
			100					105					110		
Leu	Glu	Ser	Asp	Glu	His	Gly	Lys	Thr	Leu	Arg	Leu	Thr	Leu	Pro	Glu
		115					120					125			
Gly	Leu	Ser	Gly	Glu	Gln	Lys	Ser	Gln	Trp	Leu	Leu	Thr	Ile	Lys	Ala
	130					135						140			
Val	Val	Gln	Ser	Ala	Lys	His	Trp	Asn	Leu	Ala	Glu	Cys	Thr	Phe	Glu
145					150					155					160
Ala	Ser	Gly	Glu	Gly	Val	Ile	Ile	Lys	Lys	Arg	Gln	Ile	Thr	Pro	Asp
				165					170					175	
Val	Tyr	Lys	Val	Thr	Pro	Val	Met	Asn	Thr	His	Pro	Ser	Gln		
			180					185					190		

<210> 26  
<211> 265  
<212> PRT  
<213> Vesicular stomatitis virus

<400> 26

Met	Asp	Asn	Leu	Thr	Lys	Val	Arg	Glu	Tyr	Leu	Lys	Ser	Tyr	Ser	Arg
1				5					10					15	
Leu	Asp	Gln	Ala	Val	Gly	Glu	Ile	Asp	Glu	Ile	Glu	Ala	Gln	Arg	Ala
			20					25					30		



Glu Lys Ser Asn Tyr Glu Leu Phe Gln Glu Asp Gly Val Glu Glu His  
           35                          40                          45  
 Thr Arg Pro Ser Tyr Phe Gln Ala Ala Asp Asp Ser Asp Thr Glu Ser  
           50                          55                          60  
 Glu Pro Glu Ile Glu Asp Asn Gln Gly Leu Tyr Val Pro Asp Pro Glu  
   65                          70                          75                          80  
 Ala Glu Gln Val Glu Gly Phe Ile Gln Gly Pro Leu Asp Asp Tyr Ala  
                           85                          90                          95  
 Asp Glu Asp Val Asp Val Val Phe Thr Ser Asp Trp Lys Gln Pro Glu  
                   100                          105                          110  
 Leu Glu Ser Asp Glu His Gly Lys Thr Leu Arg Leu Thr Leu Pro Glu  
           115                          120                          125  
 Gly Leu Ser Gly Glu Gln Lys Ser Gln Trp Leu Leu Thr Ile Lys Ala  
   130                          135                          140  
 Val Val Gln Ser Ala Lys His Trp Asn Leu Ala Glu Cys Thr Phe Glu  
  145                          150                          155                          160  
 Ala Ser Gly Glu Gly Val Ile Ile Lys Lys Arg Gln Ile Thr Pro Asp  
                           165                          170                          175  
 Val Tyr Lys Val Thr Pro Val Met Asn Thr His Pro Ser Gln Ser Glu  
                   180                          185                          190  
 Ala Val Ser Asp Val Trp Ser Leu Ser Lys Thr Ser Met Thr Phe Gln  
   195                          200                          205  
 Pro Lys Lys Ala Ser Leu Gln Pro Leu Thr Ile Ser Leu Asp Glu Leu  
   210                          215                          220  
 Phe Ser Ser Arg Gly Glu Phe Ile Ser Val Gly Gly Asn Gly Arg Met  
  225                          230                          235                          240  
 Ser His Lys Glu Ala Ile Leu Leu Gly Leu Arg Tyr Lys Lys Leu Tyr  
                   245                          250                          255  
 Asn Gln Ala Arg Val Lys Tyr Ser Leu  
                   260                          265

<210> 28

<211> 690

<212> DNA

<213> Vesicular stomatitis virus

<400> 28

atgagttcct taaagaagat tctcgggtctg aaggggaaag gtaagaaatc taagaaatta 60  
 gggatcgcac cacccttga tgaagaggac actagcatgg agtatgctcc gagcgctcca 120  
 attgacaaat cctatttttg agttgacgag atggacacct atgatccgaa tcaattaaga 180  
 tatgagaaat tcttctttac agtgaaaatg acgggtagat ctaatcgtcc gttcagaaca 240

tactcagatg	tggcagccgc	tgtatcccat	tgggatcaca	tgtacatcgg	aatggcaggg	300
aaacgtccct	tctacaaaat	cttggctttt	ttgggttctt	ctaatactaaa	ggccactcca	360
gcggtattgg	cagatcaagg	tcaaccagag	tatcacactc	actgcaagg	cagggcttat	420
ttgccacata	ggatggggaa	gacccctccc	atgctcaatg	taccagagca	cttcagaaga	480
ccattcaata	taggtcttta	caagggaaacg	attgagctca	caatgaccat	ctacgatgat	540
gagtcactgg	aagcagctcc	tatgatctgg	gatcatttca	attcttccaa	atcttctgat	600
ttcagagaga	aggccttaat	gtttggcctg	attgtcgaga	aaaaggcatc	tggagcgtgg	660
gtcctggatt	ctatcagcca	cttcaaatga				690

<210> 29

<211> 690

<212> DNA

<213> Vesicular stomatitis virus

<400> 29

atgagttcct	taaagaagat	tctcggctctg	aaggggaaag	gtaagaaatc	taagaaatta	60
gggatcgac	cacccccctta	tgaagaggac	actaacatgg	agtatgctcc	gagcgctcca	120
attgacaaat	cctatttttg	agttgacgag	atggacactc	atgatccgca	tcaattaaga	180
tatgagaaat	tcttctttac	agtgaataatg	acggtagat	ctaatactcc	gttcagaaca	240
tactcagatg	tggcagccgc	tgtatcccat	tgggatcaca	tgtacatcgg	aatggcaggg	300
aaacgtccct	tctacaagat	cttggctttt	ttgggttctt	ctaatactaaa	ggccactcca	360
gcggtattgg	cagatcaagg	tcaaccagag	tatcacgctc	actgtgaagg	cagggcttat	420
ttgccacaca	gaatggggaa	gacccctccc	atgctcaatg	taccagagca	cttcagaaga	480
ccattcaata	taggtcttta	caagggaaacg	gttgagctca	caatgaccat	ctacgatgat	540
gagtcactgg	aagcagctcc	tatgatctgg	gatcatttca	attcttccaa	atcttctgat	600
ttcagagaga	aggccttaat	gtttggcctg	attgtcgaga	aaaaggcatc	tggagcgtgg	660
gtcctggatt	ctgtcagcca	cttcaaatga				690

<210> 30

<211> 690

<212> DNA

<213> Vesicular stomatitis virus

<400> 30

atgagttcct	taaagaagat	tctcggctctg	aaggggaaag	gtaagaaatc	taagaaatta	60
gggatcgac	cacccccctta	tgaagaggac	actaacatgg	agtatgctcc	gagcgctcca	120
attgacaaat	cctatttttg	agttgacgag	agggacactc	atgatccgca	tcaattaaga	180
tatgagaaat	tcttctttac	agtgaataatg	acggtagat	ctaatactcc	gttcagaaca	240
tactcagatg	tggcagccgc	tgtatcccat	tgggatcaca	tgtacatcgg	aatggcaggg	300
aaacgtccct	tctacaagat	cttggctttt	ttgggttctt	ctaatactaaa	ggccactcca	360
gcggtattgg	cagatcaagg	tcaaccagag	tatcacgctc	actgtgaagg	cagggcttat	420
ttgccacaca	gaatggggaa	gacccctccc	atgctcaatg	taccagagca	cttcagaaga	480
ccattcaata	taggtcttta	caagggaaacg	gttgagctca	caatgaccat	ctacgatgat	540
gagtcactgg	aagcagctcc	tatgatctgg	gatcatttca	attcttccaa	atcttctgat	600
ttcagagaga	aggccttaat	gtttggcctg	attgtcgaga	aaaaggcatc	tggagcgtgg	660
gtcctggatt	ctgtcagcca	cttcaaatga				690

<210> 31

<211> 690

<212> DNA

<213> Vesicular stomatitis virus

<400> 31

atgagttcct	taaagaagat	tctcggctctg	aaggggaaag	gtaagaaatc	taagaaatta	60
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gggatcgcac cacccttta tgaagaggac actaacatgg agtatgctcc gagcgctcca 120
attgacaaat cctatttttg agttgacgag atggacactc atgatccgca tcaattaaga 180
tatgagaaat tcttctttac agtgaaaatg acgggttagat ctaatcgtcc gttcagaaca 240
tactcagatg tggcagccgc tgtatcccat tgggatcaca tgtacatcgg aatggcaggg 300
aaacgtccct tctacaagat cttggctttt ttgggttctt ctaatctaaa ggccactcca 360
gcggtatttg cagatcaagg tcaaccagag tatcacgctc actgtgaagg cagggcttat 420
ttgccacaca gaatggggaa gaccctctcc atgctcaatg taccagagca cttcagaaga 480
ccattcaata taggtcttta caagggaacg gttgagctca caatgacat ctacgatgat 540
gagtcactgg aagcagctcc tatgatctgg gatcatttca attcttccaa attttctgat 600
ttcagagaga aggccttaat gtttggcctg attgtcgaga aaaaggcatc tggagcttgg 660
gtcctggatt ctgtcagcca cttcaaatga 690

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<210> 32  
 <211> 229  
 <212> PRT  
 <213> Vesicular stomatitis virus

```

<400> 32
Met Ser Ser Leu Lys Lys Ile Leu Gly Leu Lys Gly Lys Gly Lys Lys
  1             5             10             15

Ser Lys Lys Leu Gly Ile Ala Pro Pro Pro Tyr Glu Glu Asp Thr Ser
  20             25             30

Met Glu Tyr Ala Pro Ser Ala Pro Ile Asp Lys Ser Tyr Phe Gly Val
  35             40             45

Asp Glu Met Asp Thr Tyr Asp Pro Asn Gln Leu Arg Tyr Glu Lys Phe
  50             55             60

Phe Phe Thr Val Lys Met Thr Val Arg Ser Asn Arg Pro Phe Arg Thr
  65             70             75             80

Tyr Ser Asp Val Ala Ala Ala Val Ser His Trp Asp His Met Tyr Ile
  85             90             95

Gly Met Ala Gly Lys Arg Pro Phe Tyr Lys Ile Leu Ala Phe Leu Gly
 100             105             110

Ser Ser Asn Leu Lys Ala Thr Pro Ala Val Leu Ala Asp Gln Gly Gln
 115             120             125

Pro Glu Tyr His Thr His Cys Glu Gly Arg Ala Tyr Leu Pro His Arg
 130             135             140

Met Gly Lys Thr Pro Pro Met Leu Asn Val Pro Glu His Phe Arg Arg
 145             150             155             160

Pro Phe Asn Ile Gly Leu Tyr Lys Gly Thr Ile Glu Leu Thr Met Thr
 165             170             175

Ile Tyr Asp Asp Glu Ser Leu Glu Ala Ala Pro Met Ile Trp Asp His
 180             185             190

Phe Asn Ser Ser Lys Phe Ser Asp Phe Arg Glu Lys Ala Leu Met Phe
 195             200             205

```

Gly Leu Ile Val Glu Lys Lys Ala Ser Gly Ala Trp Val Leu Asp Ser  
 210 215 220

Ile Ser His Phe Lys  
 225

<210> 33

<211> 229

<212> PRT

<213> Vesicular stomatitis virus

<400> 33

Met Ser Ser Leu Lys Lys Ile Leu Gly Leu Lys Gly Lys Gly Lys Lys  
 1 5 10 15

Ser Lys Lys Leu Gly Ile Ala Pro Pro Pro Tyr Glu Glu Asp Thr Asn  
 20 25 30

Met Glu Tyr Ala Pro Ser Ala Pro Ile Asp Lys Ser Tyr Phe Gly Val  
 35 40 45

Asp Glu Met Asp Thr His Asp Pro His Gln Leu Arg Tyr Glu Lys Phe  
 50 55 60

Phe Phe Thr Val Lys Met Thr Val Arg Ser Asn Arg Pro Phe Arg Thr  
 65 70 75 80

Tyr Ser Asp Val Ala Ala Val Ser His Trp Asp His Met Tyr Ile  
 85 90 95

Gly Met Ala Gly Lys Arg Pro Phe Tyr Lys Ile Leu Ala Phe Leu Gly  
 100 105 110

Ser Ser Asn Leu Lys Ala Thr Pro Ala Val Leu Ala Asp Gln Gly Gln  
 115 120 125

Pro Glu Tyr His Ala His Cys Glu Gly Arg Ala Tyr Leu Pro His Arg  
 130 135 140

Met Gly Lys Thr Pro Pro Met Leu Asn Val Pro Glu His Phe Arg Arg  
 145 150 155 160

Pro Phe Asn Ile Gly Leu Tyr Lys Gly Thr Val Glu Leu Thr Met Thr  
 165 170 175

Ile Tyr Asp Asp Glu Ser Leu Glu Ala Ala Pro Met Ile Trp Asp His  
 180 185 190

Phe Asn Ser Ser Lys Phe Ser Asp Phe Arg Glu Lys Ala Leu Met Phe  
 195 200 205

Gly Leu Ile Val Glu Lys Lys Ala Ser Gly Ala Trp Val Leu Asp Ser  
 210 215 220

Val Ser His Phe Lys  
225

<210> 34  
<211> 229  
<212> PRT  
<213> Vesicular stomatitis virus

<400> 34

Met Ser Ser Leu Lys Lys Ile Leu Gly Leu Lys Gly Lys Gly Lys Lys  
1 5 10 15

Ser Lys Lys Leu Gly Ile Ala Pro Pro Pro Tyr Glu Glu Asp Thr Asn  
20 25 30

Met Glu Tyr Ala Pro Ser Ala Pro Ile Asp Lys Ser Tyr Phe Gly Val  
35 40 45

Asp Glu Met Asp Thr His Asp Pro His Gln Leu Arg Tyr Glu Lys Phe  
50 55 60

Phe Phe Thr Val Lys Met Thr Val Arg Ser Asn Arg Pro Phe Arg Thr  
65 70 75 80

Tyr Ser Asp Val Ala Ala Val Ser His Trp Asp His Met Tyr Ile  
85 90 95

Gly Met Ala Gly Lys Arg Pro Phe Tyr Lys Ile Leu Ala Phe Leu Gly  
100 105 110

Ser Ser Asn Leu Lys Ala Thr Pro Ala Val Leu Ala Asp Gln Gly Gln  
115 120 125

Pro Glu Tyr His Ala His Cys Glu Gly Arg Ala Tyr Leu Pro His Arg  
130 135 140

Met Gly Lys Thr Pro Pro Met Leu Asn Val Pro Glu His Phe Arg Arg  
145 150 155 160

Pro Phe Asn Ile Gly Leu Tyr Lys Gly Thr Val Glu Leu Thr Met Thr  
165 170 175

Ile Tyr Asp Asp Glu Ser Leu Glu Ala Ala Pro Met Ile Trp Asp His  
180 185 190

Phe Asn Ser Ser Lys Phe Ser Asp Phe Arg Glu Lys Ala Leu Met Phe  
195 200 205

Gly Leu Ile Val Glu Lys Lys Ala Ser Gly Ala Trp Val Leu Asp Ser  
210 215 220

Val Ser His Phe Lys  
225

```
<210> 35
<211> 229
<212> PRT
<213> Vesicular stomatitis virus
```

<400> 35

Met Ser Ser Leu Lys Lys Ile Leu Gly Leu Lys Gly Lys Gly Lys Lys  
1 5 10 15

Ser Lys Lys Leu Gly Ile Ala Pro Pro Pro Tyr Glu Glu Asp Thr Asn  
20 25 30

Met Glu Tyr Ala Pro Ser Ala Pro Ile Asp Lys Ser Tyr Phe Gly Val  
35 40 45

Asp Glu Arg Asp Thr His Asp Pro His Gln Leu Arg Tyr Glu Lys Phe  
50 55 60

Phe Phe Thr Val Lys Met Thr Val Arg Ser Asn Arg Pro Phe Arg Thr  
65 70 75 80

Tyr Ser Asp Val Ala Ala Ala Val Ser His Trp Asp His Met Tyr Ile  
85 90 95

Gly Met Ala Gly Lys Arg Pro Phe Tyr Lys Ile Leu Ala Phe Leu Gly  
100 105 110

Ser Ser Asn Leu Lys Ala Thr Pro Ala Val Leu Ala Asp Gln Gly Gln  
115 120 125

Pro Glu Tyr His Ala His Cys Glu Gly Arg Ala Tyr Leu Pro His Arg  
130 135 140

Met	Gly	Lys	Thr	Pro	Pro	Met	Leu	Asn	Val	Pro	Glu	His	Phe	Arg	Arg
145					150					155					160

Pro Phe Asn Ile Gly Leu Tyr Lys Gly Thr Val Glu Leu Thr Met Thr  
165 170 175

Ile Tyr Asp Asp Glu Ser Leu Glu Ala Ala Pro Met Ile Trp Asp His  
180 185 190

Phe Asn Ser Ser Lys Phe Ser Asp Phe Arg Glu Lys Ala Leu Met Phe  
195 200 205

Gly Leu Ile Val Glu Lys Lys Ala Ser Gly Ala Trp Val Leu Asp Ser  
210 215 220

Val Ser His Phe Lys  
225



<210> 36  
<211> 1536  
<212> DNA  
<213> Vesicular stomatitis virus

```
<400> 36
atgaagtgcc ttttgtactt agccttttta ttcattgggg tgaattgcaa gttcaccata 60
gtttttccac acaacccaaa aggaaactgg aaaaatgttc cttctaatta ccattattgc 120
ccgtcaagct cagatttaaa ttggcataat gacttaatag gcacagccat acaagtcaaa 180
atgcccaga gtcacaaggc tattcaagca gacggttga tgtgtcatgc ttccaaatgg 240
gtcactactt gtgatttccg ctggtatgga ccgaagtata taacacagtc catccgatcc 300
ttcactccat ctgtagaaca atgcaaggaa agcattgaac aaacgaaaca aggaacttgg 360
ctgaatccag gcttccctcc tcaaagttgt ggatatgcaa ctgtgacgga tgccgaagca 420
gtgattgtcc aggtgactcc tcaccatgtg ctggttgatg aatacacagg agaatgggtt 480
gattcacagt tcatcaacgg aaaatgcagc aattacatat gccccactgt ccataactct 540
acaacctggc attctgacta taagggtcaa gggctatgtg attctaacct catttccatg 600
gacatcacct tcttctcaga ggacggagag ctatcatccc tgggaaagga gggcacaggg 660
ttcagaagta actactttgc ttatgaaact ggaggcaagg cctgcaaaat gcaatactgc 720
aagcattggg gagtcagact cccatcaggt gtctggttcg agatggctga taaggatctc 780
tttgctgcag ccagattccc tgaatgccc gaagggtcaa gtatctctgc tccatctcag 840
acctcagtgg atgtaagtct aattcaggac gttgagagga tcttggatta ttccctctgc 900
caagaaacct ggagcaaaat cagagcgggt cttccaatct ctccagtgga tctcagctat 960
cttgctccta aaaaccagg aaccggctct gctttcacca taatcaatgg taccctaaaa 1020
tactttgaga ccagatacat cagagtcgat attgctgctc caatcctctc aagaatgggtc 1080
ggaatgatca gtggaactac cacagaaagg gaactgtggg atgactgggc accatatgaa 1140
gacgtggaaa ttggacccaa tggagttctg aggaccagtt caggatataa gtttccttta 1200
tacatgattg gacatggtat gttggactcc gatcttcac ttagctcaaa ggctcaggtg 1260
ttcgaacatc ctcacattca agacgtctgt tcgcaacttc ctgatgatga gagtttattt 1320
tttggtgata ctgggctatc caaaaatcca atcgagcttg tagaagggtg gttcagtagt 1380
tggaagagct ctattgcctc ttttttcttt atcatagggg taatcattgg actattcttg 1440
gttctccgag ttggtatcca tctttgcatt aaattaaagc acaccaagaa aagacagatt 1500
tatacacaca tagagatgaa ccgacttggg aagtaa 1536
```

<210> 37  
<211> 885  
<212> DNA  
<213> Vesicular stomatitis virus

<220>  
<221> modified\_base  
<222> (1)..(885)  
<223> "n" represents a, t, c, g, other or unknown

```
<400> 37
atgaagtgcc ttttgcactt agcttttttta ttcactgggg tgaattgcaa gttcaccata 60
gtttttccat acaacccaaa aggaaactgg aaaaatgttc cttccaatta ccattattgc 120
ccgtcaagct cagatttaaa ttgncataat gacttaatag gcacagcctt acaagtcaaa 180
atgcccaga gtcacaaggc tattcaagca gacggttga tgtgtcatgc ttccaaatgg 240
gtcactactt gtgatttccg ctggtacgga ccgaagtata taacacattc catccgatcc 300
ttcactccat ctgtagaaca atgcaaggaa agcattgaac aaacgaaaca aggaacttgg 360
ctgaatccag gcttccctcc tcaaagttgt ggatatgcaa ctgtgacgga tgctgaagca 420
gcgattgtcc aggtgactcc tcaccatgtg cttgttgatg aatacacagg agaatgggtt 480
gattcacagt tcatcaacgg aaaatgcagc aatgacatat gccccactgt ccataactcc 540
acaacctggc attccgacta taagggtcaa gggctatgtg attctaacct catttccatg 600
gacatcacct tcttctcaga ggacggagag ctatcatccc taggaaagga gggcacaggg 660
ttcagaagta actactttgc ttatgaaact ggagacaagg cctgcaaaat gcagtactgc 720
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aagcgttggg	gagtcagact	cccatcaggt	gtctggttcg	agatggctga	taaggatctc	780
tttgctgcag	ccagattccc	tgaatgccc	gaagggtcaa	gtatctctgc	tccatctcag	840
acctcagtgg	atgtaagtct	cattcaggac	gttgagagga	tcttg		885

<210> 38  
 <211> 705  
 <212> DNA  
 <213> Vesicular stomatitis virus

<400> 38						
ccatctcaga	cctcagtggg	tgtaagtctc	attcaggacg	ttgagaggat	cttggattat	60
tccctctgcc	aagaaacctg	gagcaaatc	agagcgggtc	ttcccatctc	tccagtggat	120
ctcagctatc	ttgctcctaa	aaaccaggga	accggtcctg	tctttaccat	aatcaatggg	180
accctaaaat	actttgagac	cagatacatc	agagtcgata	ttgctgctcc	aatcctctca	240
agaatggctg	gaatgatcag	tggaactacc	acagaaaggg	aactgtggga	tgactgggct	300
ccatatgaag	acgtggaaat	tggaaccaat	ggagttctga	ggaccagttc	aggatataag	360
tttcctttat	atatgattgg	acatgggatg	ttggactccg	atcttcatct	tagctcaaag	420
gctcaggtgt	ttgaacatcc	tcacattcaa	gacgctgctt	cgcagcttcc	tgatgatgag	480
actttatttt	ttggtgatac	tggtctatcc	aaaaatccaa	tcgagtttgt	agaaggttgg	540
ttcagtagtt	ggaagagctc	tattgcctct	tttttcttta	tcataggggt	aatcattgga	600
ctattcttgg	ttctccgagt	tggtatttat	ctttgcatta	aattaaagca	caccaagaaa	660
agacagattt	atacagacat	agagatgaac	cgacttggga	agtaa		705

<210> 39  
 <211> 1536  
 <212> DNA  
 <213> Vesicular stomatitis virus

<400> 39						
atgaagtgcc	ttttgtactt	agctttttta	ttcatcgggg	tgaattgcaa	gttcaccata	60
gtttttccat	acaaccgaaa	aggaaactgg	aaaaatgttc	cttccaatta	ccattattgc	120
ccgtcaagct	cagattttaa	ttggcataat	gacttaatag	gcacagcctt	acaagtcaaa	180
atgccaaga	gtcacaaggc	tattcaagca	gacggttggg	tgtgtcatgc	ttccaaatgg	240
gtcactactt	gtgatttccg	ctggtacgga	ccgaagtata	taacacattc	catccgatcc	300
ttcactccat	ctgtagaaca	atgcaaggaa	agcattgaac	aaacgaaaca	aggaacttgg	360
ctgaatccag	gcttccctcc	tcaaagtgtg	ggatatgcaa	ctgtgacgga	tgctgaagca	420
gcgattgtcc	aggtgactcc	tcaccatgtg	cttggtgatg	aatacacagg	agaatgggtt	480
gattcacagt	tcatacaagg	aaaatgcagc	aatgacatat	gccccactgt	ccataactcc	540
acaacctggc	attccgacta	taaggtcaaa	gggctatgtg	attctaacct	catttccatg	600
gacatcacct	tcttctcaga	ggacggagag	ctatcatccc	taggaaagga	gggcacaggg	660
ttcagaagta	actactttgc	ttatgaaact	ggagacaagg	cctgcaaaat	gcagtactgc	720
aagcattggg	gagtcagact	cccatcaggt	gtctggttcg	agatggctga	taaggatctc	780
tttgctgcag	ccagattccc	tgaatgccc	gaagggtcaa	gtatctctgc	tccatctcag	840
acctcagtgg	atgtaagtct	cattcaggac	gttgagagga	tcttggatta	ttccctctgc	900
caagaaacct	ggagcaaaat	cagagcgggt	cttcccatct	ctccagtggg	tctcagctat	960
cttgctccta	aaaaccagg	aaccggtcct	gctttcacca	taatcaatgg	taccctaaaa	1020
tactttgaga	ccagatacat	cagagtcgat	attgctgctc	caatcctctc	aagaatgggtc	1080
ggaatgatca	gtggaactac	cacagaaagg	gaactgtggg	atgactgggc	tccatatgaa	1140
gacgtggaaa	ttggacccaa	tgaggttctg	aggaccagtt	caggatataa	gtttccttta	1200
tatatgattg	gacatggtat	gttggactcc	gactctcatc	ttagctcaaa	ggctcaggtg	1260
tttgaacatc	ctcacattca	agacgctght	gcgcagcttc	ctgatgatga	gactttatct	1320
tttggtgata	ctgggctatc	caaaaatcca	atcgagtttg	tagaaggttg	gttcagtagt	1380
tggaagagct	ctattgcctc	tttttctttt	atcatagggg	taatcattgg	actattcttg	1440
gttctccgag	ttggtattta	tctttgcatt	aaattaaagc	acaccaagaa	aagacagatt	1500
tatacagaca	tagagatgaa	ccgacttggg	aagtaa			1536

<210> 40  
 <211> 1399  
 <212> DNA  
 <213> Vesicular stomatitis virus

<400> 40  
 atgaagtgcc ttttgtactt agcttttttta ttcacatgggg tgaattgcaa gttcaccata 60  
 gtttttccat acaacccaaaa aggaaactgg aaaaatgttc cttccaatta ccattattgc 120  
 ccgtcaagct cagattttaa ttggcataat gacttaatag gcacagcctt acaggtcaaa 180  
 atgcccaga gtcacaaggc tattcaagca gacggttgga tgtgtcatgc ttccaaatgg 240  
 gtcactactt gtgatttccg ctggtacgga ccgaagtata taacacattc catccgatcc 300  
 ttcactccat ctgtagaaca atgcaaggaa agcattgaac aaacgaaaca aggaacttgg 360  
 ctgaatccag gcttccctcc tcaaagtgtt ggatatgcaa ctgtgacgga tgctgaagca 420  
 gcgattgtcc aggtgactcc tcaccatgtg cttgttgatg aatacacagg agaatgggtt 480  
 gattcacagt tcatcaacgg aaaatgcagc aatgacatat gcccactgt ccataactcc 540  
 acaacctggc attccgacta taagggtcaaa gggctatgtg attctaacct catttccatg 600  
 gacatcacct tcttctcaga ggacggagag ctatcatccc taggaaagga gggcacaggg 660  
 ttcagaagta actactttgc ttatgaaact ggagacaagg cctgcaaaat gcagtactgc 720  
 aagcgttggg gagtcagact cccatcaggt gtctgggttc ggatggctga taaggatctc 780  
 tttgctgcag ccagattccc tgaatgccc gaagggtcaa gtatctctgc tccatctcag 840  
 acctcagtgg atgtaagtct cattcaggac gttgagagga tcttactttg agaccagata 900  
 catcagagtc gatattgctg ctccaatcct ctcaagaatg gtcggaatga tcagtgggaa 960  
 taccacagaa agggaactgt gggatgactg ggctccatat gaagacgtgg aaattggacc 1020  
 caatggagtt ctgaggacca gttcaggata taagtttcct ttatatatga ttggacatgg 1080  
 tatgttggac tccgatcttc atcttagctc aaaggctcag gtgtttgaac atcctcacat 1140  
 tcaagacgct gcttcgcagc ttcctgatga tgagacttta ttttttgggtg atactgggct 1200  
 atccaaaaat ccaatcgagt ttgtagaagg ttggttcagt agttggaaga gctctattgc 1260  
 ctcttttttc tttatcatag ggtaatcat tggactattc ttggttctcc gagttgggat 1320  
 ttatctttgc attaaattaa agcacaccaa gaaaagacag atttatacag acatagagat 1380  
 gaaccgactt gggaggttaa 1399

<210> 41  
 <211> 511  
 <212> PRT  
 <213> Vesicular stomatitis virus

<400> 41  
 Met Lys Cys Leu Leu Tyr Leu Ala Phe Leu Phe Ile Gly Val Asn Cys  
 1 5 10 15  
 Lys Phe Thr Ile Val Phe Pro His Asn Gln Lys Gly Asn Trp Lys Asn  
 20 25 30  
 Val Pro Ser Asn Tyr His Tyr Cys Pro Ser Ser Ser Asp Leu Asn Trp  
 35 40 45  
 His Asn Asp Leu Ile Gly Thr Ala Ile Gln Val Lys Met Pro Lys Ser  
 50 55 60  
 His Lys Ala Ile Gln Ala Asp Gly Trp Met Cys His Ala Ser Lys Trp  
 65 70 75 80  
 Val Thr Thr Cys Asp Phe Arg Trp Tyr Gly Pro Lys Tyr Ile Thr Gln  
 85 90 95

Ser	Ile	Arg	Ser	Phe	Thr	Pro	Ser	Val	Glu	Gln	Cys	Lys	Glu	Ser	Ile	100	105	110
Glu	Gln	Thr	Lys	Gln	Gly	Thr	Trp	Leu	Asn	Pro	Gly	Phe	Pro	Pro	Gln	115	120	125
Ser	Cys	Gly	Tyr	Ala	Thr	Val	Thr	Asp	Ala	Glu	Ala	Val	Ile	Val	Gln	130	135	140
Val	Thr	Pro	His	His	Val	Leu	Val	Asp	Glu	Tyr	Thr	Gly	Glu	Trp	Val	145	150	155
Asp	Ser	Gln	Phe	Ile	Asn	Gly	Lys	Cys	Ser	Asn	Tyr	Ile	Cys	Pro	Thr	165	170	175
Val	His	Asn	Ser	Thr	Thr	Trp	His	Ser	Asp	Tyr	Lys	Val	Lys	Gly	Leu	180	185	190
Cys	Asp	Ser	Asn	Leu	Ile	Ser	Met	Asp	Ile	Thr	Phe	Phe	Ser	Glu	Asp	195	200	205
Gly	Glu	Leu	Ser	Ser	Leu	Gly	Lys	Glu	Gly	Thr	Gly	Phe	Arg	Ser	Asn	210	215	220
Tyr	Phe	Ala	Tyr	Glu	Thr	Gly	Gly	Lys	Ala	Cys	Lys	Met	Gln	Tyr	Cys	225	230	235
Lys	His	Trp	Gly	Val	Arg	Leu	Pro	Ser	Gly	Val	Trp	Phe	Glu	Met	Ala	245	250	255
Asp	Lys	Asp	Leu	Phe	Ala	Ala	Ala	Arg	Phe	Pro	Glu	Cys	Pro	Glu	Gly	260	265	270
Ser	Ser	Ile	Ser	Ala	Pro	Ser	Gln	Thr	Ser	Val	Asp	Val	Ser	Leu	Ile	275	280	285
Gln	Asp	Val	Glu	Arg	Ile	Leu	Asp	Tyr	Ser	Leu	Cys	Gln	Glu	Thr	Trp	290	295	300
Ser	Lys	Ile	Arg	Ala	Gly	Leu	Pro	Ile	Ser	Pro	Val	Asp	Leu	Ser	Tyr	305	310	315
Leu	Ala	Pro	Lys	Asn	Pro	Gly	Thr	Gly	Pro	Ala	Phe	Thr	Ile	Ile	Asn	325	330	335
Gly	Thr	Leu	Lys	Tyr	Phe	Glu	Thr	Arg	Tyr	Ile	Arg	Val	Asp	Ile	Ala	340	345	350
Ala	Pro	Ile	Leu	Ser	Arg	Met	Val	Gly	Met	Ile	Ser	Gly	Thr	Thr	Thr	355	360	365
Glu	Arg	Glu	Leu	Trp	Asp	Asp	Trp	Ala	Pro	Tyr	Glu	Asp	Val	Glu	Ile	370	375	380
Gly	Pro	Asn	Gly	Val	Leu	Arg	Thr	Ser	Ser	Gly	Tyr	Lys	Phe	Pro	Leu	385	390	395
																		400



Ser Cys Gly Tyr Ala Thr Val Thr Asp Ala Glu Ala Ala Ile Val Gln  
 130 135 140  
 Val Thr Pro His His Val Leu Val Asp Glu Tyr Thr Gly Glu Trp Val  
 145 150 155 160  
 Asp Ser Gln Phe Ile Asn Gly Lys Cys Ser Asn Asp Ile Cys Pro Thr  
 165 170 175  
 Val His Asn Ser Thr Thr Trp His Ser Asp Tyr Lys Val Lys Gly Leu  
 180 185 190  
 Cys Asp Ser Asn Leu Ile Ser Met Asp Ile Thr Phe Phe Ser Glu Asp  
 195 200 205  
 Gly Glu Leu Ser Ser Leu Gly Lys Glu Gly Thr Gly Phe Arg Ser Asn  
 210 215 220  
 Tyr Phe Ala Tyr Glu Thr Gly Asp Lys Ala Cys Lys Met Gln Tyr Cys  
 225 230 235 240  
 Lys Arg Trp Gly Val Arg Leu Pro Ser Gly Val Trp Phe Glu Met Ala  
 245 250 255  
 Asp Lys Asp Leu Phe Ala Ala Ala Arg Phe Pro Glu Cys Pro Glu Gly  
 260 265 270  
 Ser Ser Ile Ser Ala Pro Ser Gln Thr Ser Val Asp Val Ser Leu Ile  
 275 280 285  
 Gln Asp Val Glu Arg Ile Leu  
 290 295

<210> 43  
 <211> 234  
 <212> PRT  
 <213> Vesicular stomatitis virus

<400> 43  
 Pro Ser Gln Thr Ser Val Asp Val Ser Leu Ile Gln Asp Val Glu Arg  
 1 5 10 15  
 Ile Leu Asp Tyr Ser Leu Cys Gln Glu Thr Trp Ser Lys Ile Arg Ala  
 20 25 30  
 Gly Leu Pro Ile Ser Pro Val Asp Leu Ser Tyr Leu Ala Pro Lys Asn  
 35 40 45  
 Pro Gly Thr Gly Pro Val Phe Thr Ile Ile Asn Gly Thr Leu Lys Tyr  
 50 55 60  
 Phe Glu Thr Arg Tyr Ile Arg Val Asp Ile Ala Ala Pro Ile Leu Ser  
 65 70 75 80

Arg Met Val Gly Met Ile Ser Gly Thr Thr Thr Glu Arg Glu Leu Trp  
                     85                    90                    95  
 Asp Asp Trp Ala Pro Tyr Glu Asp Val Glu Ile Gly Pro Asn Gly Val  
                     100                    105                    110  
 Leu Arg Thr Ser Ser Gly Tyr Lys Phe Pro Leu Tyr Met Ile Gly His  
                     115                    120                    125  
 Gly Met Leu Asp Ser Asp Leu His Leu Ser Ser Lys Ala Gln Val Phe  
                     130                    135                    140  
 Glu His Pro His Ile Gln Asp Ala Ala Ser Gln Leu Pro Asp Asp Glu  
 145                    150                    155                    160  
 Thr Leu Phe Phe Gly Asp Thr Gly Leu Ser Lys Asn Pro Ile Glu Phe  
                     165                    170                    175  
 Val Glu Gly Trp Phe Ser Ser Trp Lys Ser Ser Ile Ala Ser Phe Phe  
                     180                    185                    190  
 Phe Ile Ile Gly Leu Ile Ile Gly Leu Phe Leu Val Leu Arg Val Gly  
                     195                    200                    205  
 Ile Tyr Leu Cys Ile Lys Leu Lys His Thr Lys Lys Arg Gln Ile Tyr  
                     210                    215                    220  
 Thr Asp Ile Glu Met Asn Arg Leu Gly Lys  
 225                    230

<210> 44  
 <211> 511  
 <212> PRT  
 <213> Vesicular stomatitis virus  
  
 <220>  
 <221> MOD\_RES  
 <222> (1)..(511)  
 <223> "Xaa" represents any, other or unknown amino acid

<400> 44  
 Met Lys Cys Leu Leu Tyr Leu Ala Phe Leu Phe Ile Gly Val Asn Cys  
   1                    5                    10                    15  
 Lys Phe Thr Ile Val Phe Pro Tyr Asn Arg Lys Gly Asn Trp Lys Asn  
                     20                    25                    30  
 Val Pro Ser Asn Tyr His Tyr Cys Pro Ser Ser Ser Asp Leu Asn Trp  
                     35                    40                    45  
 His Asn Asp Leu Ile Gly Thr Ala Leu Gln Val Lys Met Pro Lys Ser  
                     50                    55                    60  
 His Lys Ala Ile Gln Ala Asp Gly Trp Met Cys His Ala Ser Lys Trp  
   65                    70                    75                    80

Val	Thr	Thr	Cys	Asp	Phe	Arg	Trp	Tyr	Gly	Pro	Lys	Tyr	Ile	Thr	His	
				85					90					95		
Ser	Ile	Arg	Ser	Phe	Thr	Pro	Ser	Val	Glu	Gln	Cys	Lys	Glu	Ser	Ile	
			100					105					110			
Glu	Gln	Thr	Lys	Gln	Gly	Thr	Trp	Leu	Asn	Pro	Gly	Phe	Pro	Pro	Gln	
		115					120					125				
Ser	Cys	Gly	Tyr	Ala	Thr	Val	Thr	Asp	Ala	Glu	Ala	Ala	Ile	Val	Gln	
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Val	Thr	Pro	His	His	Val	Leu	Val	Asp	Glu	Tyr	Thr	Gly	Glu	Trp	Val	
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Asp	Ser	Gln	Phe	Ile	Asn	Gly	Lys	Cys	Ser	Asn	Asp	Ile	Cys	Pro	Thr	
				165					170					175		
Val	His	Asn	Ser	Thr	Thr	Trp	His	Ser	Asp	Tyr	Lys	Val	Lys	Gly	Leu	
			180					185					190			
Cys	Asp	Ser	Asn	Leu	Ile	Ser	Met	Asp	Ile	Thr	Phe	Phe	Ser	Glu	Asp	
		195					200					205				
Gly	Glu	Leu	Ser	Ser	Leu	Gly	Lys	Glu	Gly	Thr	Gly	Phe	Arg	Ser	Asn	
	210					215					220					
Tyr	Phe	Ala	Tyr	Glu	Thr	Gly	Asp	Lys	Ala	Cys	Lys	Met	Gln	Tyr	Cys	
225					230					235					240	
Lys	His	Trp	Gly	Val	Arg	Leu	Pro	Ser	Gly	Val	Trp	Phe	Glu	Met	Ala	
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Asp	Lys	Asp	Leu	Phe	Ala	Ala	Ala	Arg	Phe	Pro	Glu	Cys	Pro	Glu	Gly	
			260					265					270			
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Gln	Asp	Val	Glu	Arg	Ile	Leu	Asp	Tyr	Ser	Leu	Cys	Gln	Glu	Thr	Trp	
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Ser	Lys	Ile	Arg	Ala	Gly	Leu	Pro	Ile	Ser	Pro	Val	Asp	Leu	Ser	Tyr	
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Leu	Ala	Pro	Lys	Asn	Pro	Gly	Thr	Gly	Pro	Ala	Phe	Thr	Ile	Ile	Asn	
				325					330					335		
Gly	Thr	Leu	Lys	Tyr	Phe	Glu	Thr	Arg	Tyr	Ile	Arg	Val	Asp	Ile	Ala	
		340						345					350			
Ala	Pro	Ile	Leu	Ser	Arg	Met	Val	Gly	Met	Ile	Ser	Gly	Thr	Thr	Thr	
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Glu	Arg	Glu	Leu	Trp	Asp	Asp	Trp	Ala	Pro	Tyr	Glu	Asp	Val	Glu	Ile	
	370					375					380					



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 Tyr Met Ile Gly His Gly Met Leu Asp Ser Asp Leu His Leu Ser Ser  
 405 410 415  
 Lys Ala Gln Val Phe Glu His Pro His Ile Gln Asp Ala Xaa Ala Gln  
 420 425 430  
 Leu Pro Asp Asp Glu Thr Leu Phe Phe Gly Asp Thr Gly Leu Ser Lys  
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<210> 45  
 <211> 465  
 <212> PRT  
 <213> Vesicular stomatitis virus

<400> 45  
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 His Asn Asp Leu Ile Gly Thr Ala Leu Gln Val Lys Met Pro Lys Ser  
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 His Lys Ala Ile Gln Ala Asp Gly Trp Met Cys His Ala Ser Lys Trp  
 65 70 75 80  
 Val Thr Thr Cys Asp Phe Arg Trp Tyr Gly Pro Lys Tyr Ile Thr His  
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 Ser Ile Arg Ser Phe Thr Pro Ser Val Glu Gln Cys Lys Glu Ser Ile  
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 Glu Gln Thr Lys Gln Gly Thr Trp Leu Asn Pro Gly Phe Pro Pro Gln  
 115 120 125  
 Ser Cys Gly Tyr Ala Thr Val Thr Asp Ala Glu Ala Ala Ile Val Gln  
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Val	Thr	Pro	His	His	Val	Leu	Val	Asp	Glu	Tyr	Thr	Gly	Glu	Trp	Val		
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Asp	Ser	Gln	Phe	Ile	Asn	Gly	Lys	Cys	Ser	Asn	Asp	Ile	Cys	Pro	Thr		
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Val	His	Asn	Ser	Thr	Thr	Trp	His	Ser	Asp	Tyr	Lys	Val	Lys	Gly	Leu		
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Lys	Arg	Trp	Gly	Val	Arg	Leu	Pro	Ser	Gly	Val	Trp	Phe	Gly	Met	Ala		
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Ser	Lys	Asn	Pro	Ile	Glu	Phe	Val	Glu	Gly	Trp	Phe	Ser	Ser	Trp	Lys		
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Ser	Ser	Ile	Ala	Ser	Phe	Phe	Phe	Ile	Ile	Gly	Leu	Ile	Ile	Gly	Leu		
			420					425					430				
Phe	Leu	Val	Leu	Arg	Val	Gly	Ile	Tyr	Leu	Cys	Ile	Lys	Leu	Lys	His		
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 450 455 460

Lys  
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 <211> 6330  
 <212> DNA  
 <213> Vesicular stomatitis virus

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<210> 47

<211> 5327

<212> DNA

<213> Vesicular stomatitis virus

<400> 47

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<211> 348

<212> DNA

<213> Vesicular stomatitis virus

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<213> Vesicular stomatitis virus

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Thr	Asn	Ala	Leu	Thr	Val	Ala	His	Phe	Ala	Glu	Asn	Pro	Ile	Asn	Ala	820	825	830

Met	Ile	Gln	Tyr	Asn	Tyr	Phe	Gly	Thr	Phe	Ala	Arg	Leu	Leu	Leu	Met	835	840	845	
Met	His	Asp	Pro	Ala	Leu	Arg	Gln	Ser	Leu	Tyr	Glu	Val	Gln	Asp	Lys	850	855	860	
Ile	Pro	Gly	Leu	His	Ser	Ser	Thr	Phe	Lys	Tyr	Ala	Met	Leu	Tyr	Leu	865	870	875	880
Asp	Pro	Ser	Ile	Gly	Gly	Val	Ser	Gly	Met	Ser	Leu	Ser	Arg	Phe	Leu	885	890	895	
Ile	Arg	Ala	Phe	Pro	Asp	Pro	Val	Thr	Glu	Ser	Leu	Ser	Phe	Trp	Arg	900	905	910	
Phe	Ile	His	Val	His	Ala	Arg	Ser	Glu	His	Leu	Lys	Glu	Met	Ser	Ala	915	920	925	
Val	Phe	Gly	Asn	Pro	Glu	Ile	Ala	Lys	Phe	Arg	Ile	Thr	His	Ile	Asp	930	935	940	
Lys	Leu	Val	Glu	Asp	Pro	Thr	Ser	Leu	Asn	Ile	Ala	Met	Gly	Met	Ser	945	950	955	960
Pro	Ala	Asn	Leu	Leu	Lys	Thr	Glu	Val	Lys	Lys	Cys	Leu	Ile	Glu	Ser	965	970	975	
Arg	Gln	Thr	Ile	Arg	Asn	Gln	Val	Ile	Lys	Asp	Ala	Thr	Ile	Tyr	Leu	980	985	990	
Tyr	His	Glu	Glu	Asp	Arg	Leu	Arg	Ser	Phe	Leu	Trp	Ser	Ile	Asn	Pro	995	1000	1005	
Leu	Phe	Pro	Arg	Phe	Leu	Ser	Glu	Phe	Lys	Ser	Gly	Thr	Phe	Leu	Gly	1010	1015	1020	
Val	Ala	Asp	Gly	Leu	Ile	Ser	Leu	Phe	Gln	Asn	Ser	Arg	Thr	Ile	Arg	1025	1030	1035	1040
Asn	Ser	Phe	Lys	Lys	Lys	Tyr	His	Arg	Glu	Leu	Asp	Asp	Leu	Ile	Val	1045	1050	1055	
Arg	Ser	Glu	Val	Ser	Ser	Leu	Thr	His	Leu	Gly	Lys	Leu	His	Leu	Arg	1060	1065	1070	
Arg	Gly	Ser	Cys	Lys	Met	Trp	Thr	Cys	Ser	Ala	Thr	His	Ala	Asp	Thr	1075	1080	1085	
Leu	Arg	Tyr	Lys	Ser	Trp	Gly	Arg	Thr	Val	Ile	Gly	Thr	Thr	Val	Pro	1090	1095	1100	
His	Pro	Leu	Glu	Met	Leu	Gly	Pro	Gln	His	Arg	Lys	Glu	Thr	Pro	Cys	1105	1110	1115	1120
Ala	Pro	Cys	Asn	Thr	Ser	Gly	Phe	Asn	Tyr	Val	Ser	Val	His	Cys	Pro	1125	1130	1135	

Asp Gly Ile His	Asp Val Phe Ser Ser Arg Gly Pro Leu Pro Ala Tyr
1140	1145 1150
Leu Gly Ser Lys Thr Ser Glu Ser Thr Ser Ile Leu Gln Pro Trp Glu	
1155	1160 1165
Arg Glu Ser Lys Val Pro Leu Ile Lys Arg Ala Thr Arg Leu Arg Asp	
1170	1175 1180
Ala Ile Ser Trp Phe Val Glu Pro Asp Ser Lys Leu Ala Met Thr Ile	
1185	1190 1195 1200
Leu Ser Asn Ile His Ser Leu Thr Gly Glu Glu Trp Thr Lys Arg Gln	
1205	1210 1215
His Gly Phe Lys Arg Thr Gly Ser Ala Leu His Arg Phe Ser Thr Ser	
1220	1225 1230
Arg Met Ser His Gly Gly Phe Ala Ser Gln Ser Thr Ala Ala Leu Thr	
1235	1240 1245
Arg Leu Met Ala Thr Thr Asp Thr Met Arg Asp Leu Gly Asp Gln Asn	
1250	1255 1260
Phe Asp Phe Leu Phe Gln Ala Thr Leu Leu Tyr Ala Gln Ile Thr Thr	
1265	1270 1275 1280
Thr Val Ala Arg Asp Gly Trp Ile Thr Ser Cys Thr Asp His Tyr His	
1285	1290 1295
Ile Ala Cys Lys Ser Cys Leu Arg Pro Ile Glu Glu Ile Thr Leu Asp	
1300	1305 1310
Ser Ser Met Asp Tyr Thr Pro Pro Asp Val Ser His Val Leu Lys Thr	
1315	1320 1325
Trp Arg Asn Gly Glu Gly Ser Trp Gly Gln Glu Ile Lys Gln Ile Tyr	
1330	1335 1340
Pro Leu Glu Gly Asn Trp Lys Asn Leu Ala Pro Ala Glu Gln Ser Tyr	
1345	1350 1355 1360
Gln Val Gly Arg Cys Ile Gly Phe Leu Tyr Gly Asp Leu Ala Tyr Arg	
1365	1370 1375
Lys Ser Thr His Ala Glu Asp Ser Ser Leu Phe Pro Leu Ser Ile Gln	
1380	1385 1390
Gly Arg Ile Arg Gly Arg Gly Phe Leu Lys Gly Leu Leu Asp Gly Leu	
1395	1400 1405
Met Arg Ala Ser Cys Cys Gln Val Ile His Arg Arg Ser Leu Ala His	
1410	1415 1420
Leu Lys Arg Pro Ala Asn Ala Val Tyr Gly Gly Leu Ile Tyr Leu Ile	
1425	1430 1435 1440

Asp Lys Leu Ser Val Ser Pro Pro Phe Leu Ser Leu Thr Arg Ser Gly	1445	1450	1455
Pro Ile Arg Asp Glu Leu Glu Thr Ile Pro His Lys Ile Pro Thr Ser	1460	1465	1470
Tyr Pro Thr Ser Asn Arg Asp Met Gly Val Ile Val Arg Asn Tyr Phe	1475	1480	1485
Lys Tyr Gln Cys Arg Leu Ile Glu Lys Gly Lys Tyr Arg Ser His Tyr	1490	1495	1500
Ser Gln Leu Trp Leu Phe Ser Asp Val Leu Ser Ile Asp Phe Ile Gly	1505	1510	1515
Pro Phe Ser Ile Ser Thr Thr Leu Leu Gln Ile Leu Tyr Lys Pro Phe	1525	1530	1535
Leu Ser Gly Lys Asp Lys Asn Glu Leu Arg Glu Leu Ala Asn Leu Ser	1540	1545	1550
Ser Leu Leu Arg Ser Gly Glu Gly Trp Glu Asp Ile His Val Lys Phe	1555	1560	1565
Phe Thr Lys Asp Ile Leu Leu Cys Pro Glu Glu Ile Arg His Ala Cys	1570	1575	1580
Lys Phe Gly Ile Ala Lys Asp Asn Asn Lys Asp Met Ser Tyr Pro Pro	1585	1590	1595
Trp Gly Arg Glu Ser Arg Gly Thr Ile Thr Thr Ile Pro Val Tyr Tyr	1605	1610	1615
Thr Thr Thr Pro Tyr Pro Lys Met Leu Glu Met Pro Pro Arg Ile Gln	1620	1625	1630
Asn Pro Leu Leu Ser Gly Ile Arg Leu Gly Gln Leu Pro Thr Gly Ala	1635	1640	1645
His Tyr Lys Ile Arg Ser Ile Leu His Gly Met Gly Ile His Tyr Arg	1650	1655	1660
Asp Phe Leu Ser Cys Gly Asp Gly Ser Gly Gly Met Thr Ala Ala Leu	1665	1670	1675
Leu Arg Glu Asn Val His Ser Arg Gly Ile Phe Asn Ser Leu Leu Glu	1685	1690	1695
Leu Ser Gly Ser Val Met Arg Gly Ala Ser Pro Glu Pro Pro Ser Ala	1700	1705	1710
Leu Glu Thr Leu Gly Gly Asp Lys Ser Arg Cys Val Asn Gly Glu Thr	1715	1720	1725
Cys Trp Glu Tyr Pro Ser Asp Leu Cys Asp Pro Arg Thr Trp Asp Tyr	1730	1735	1740

Phe Leu Arg Leu Lys Ala Gly Leu Gly Leu Gln Ile Asp Leu Ile Val  
1745 1750 1755 1760  
Met Asp Met Glu Val Arg Asp Ser Ser Thr Ser Leu Lys Ile Glu Thr  
1765 1770 1775  
Asn Val Arg Asn Tyr Val His Arg Ile Leu Asp Glu Gln Gly Val Leu  
1780 1785 1790  
Ile Tyr Lys Thr Tyr Gly Thr Tyr Ile Cys Glu Ser Glu Lys Asn Ala  
1795 1800 1805  
Val Thr Ile Leu Gly Pro Met Phe Lys Thr Val Asp Leu Val Gln Thr  
1810 1815 1820  
Glu Phe Ser Ser Ser Gln Thr Ser Glu Val Tyr Met Val Cys Lys Gly  
1825 1830 1835 1840  
Leu Lys Lys Leu Ile Asp Glu Pro Asn Pro Asp Trp Ser Ser Ile Asn  
1845 1850 1855  
Glu Ser Trp Lys Asn Leu Tyr Ala Phe Gln Ser Ser Glu Gln Glu Phe  
1860 1865 1870  
Ala Arg Ala Lys Lys Val Ser Thr Tyr Phe Thr Leu Thr Gly Ile Pro  
1875 1880 1885  
Ser Gln Phe Ile Pro Asp Pro Phe Val Asn Ile Glu Thr Met Leu Gln  
1890 1895 1900  
Ile Phe Gly Val Pro Thr Gly Val Ser His Ala Ala Ala Leu Lys Ser  
1905 1910 1915 1920  
Ser Asp Arg Pro Ala Asp Leu Leu Thr Ile Ser Leu Phe Tyr Met Ala  
1925 1930 1935  
Ile Ile Ser Tyr Tyr Asn Ile Asn His Ile Arg Val Gly Pro Ile Pro  
1940 1945 1950  
Pro Asn Pro Pro Ser Asp Gly Ile Ala Gln Asn Val Gly Ile Ala Ile  
1955 1960 1965  
Thr Gly Ile Ser Phe Trp Leu Ser Leu Met Glu Lys Asp Ile Pro Leu  
1970 1975 1980  
Tyr Gln Gln Cys Leu Ala Val Ile Gln Gln Ser Phe Pro Ile Arg Trp  
1985 1990 1995 2000  
Glu Ala Val Ser Val Lys Gly Gly Tyr Lys Gln Lys Trp Ser Thr Arg  
2005 2010 2015  
Gly Asp Gly Leu Pro Lys Asp Thr Arg Thr Ser Asp Ser Leu Ala Pro  
2020 2025 2030  
Ile Gly Asn Trp Ile Arg Ser Leu Glu Leu Val Arg Asn Gln Val Arg  
2035 2040 2045

Leu Asn Pro Phe Asn Glu Ile Leu Phe Asn Gln Leu Cys Arg Thr Val  
 2050 2055 2060

Asp Asn His Leu Lys Trp Ser Asn Leu Arg Arg Asn Thr Gly Met Ile  
 2065 2070 2075 2080

Glu Trp Ile Asn Arg Arg Ile Ser Lys Glu Asp Arg Ser Ile Leu Met  
 2085 2090 2095

Leu Lys Ser Asp Leu His Glu Glu Asn Ser Trp Arg Asp  
 2100 2105

<210> 51  
 <211> 1753  
 <212> PRT  
 <213> Vesicular stomatitis virus

<220>  
 <221> MOD\_RES  
 <222> (1)..(1753)  
 <223> "Xaa" represents any, other or unknown amino acid

<400> 51  
 His Trp Gly His Pro Phe Ile Asp Tyr Tyr Ala Gly Leu Glu Lys Leu  
 1 5 10 15

His Ser Gln Val Thr Xaa Lys Lys Asp Ile Asp Val Ser Tyr Ala Lys  
 20 25 30

Ala Leu Ala Ser Asp Leu Ala Arg Ile Val Leu Phe Gln Gln Phe Asn  
 35 40 45

Asp His Xaa Lys Trp Phe Val Asn Gly Asp Leu Leu Pro His Asp His  
 50 55 60

Pro Phe Lys Ser His Val Lys Glu Asn Thr Trp Pro Thr Ala Ala Gln  
 65 70 75 80

Val Gln Asp Phe Gly Asp Lys Trp His Glu Leu Pro Leu Ile Lys Cys  
 85 90 95

Phe Glu Ile Pro Asp Leu Leu Asp Pro Ser Ile Ile Tyr Ser Asp Lys  
 100 105 110

Ser His Ser Met Asn Arg Ser Glu Val Leu Lys His Val Arg Met Asn  
 115 120 125

Pro Asn Thr Pro Ile Pro Ser Lys Lys Val Leu Gln Thr Met Leu Asp  
 130 135 140

Thr Lys Ala Thr Asn Trp Lys Glu Phe Leu Lys Glu Ile Asp Glu Lys  
 145 150 155 160

Gly Leu Asp Asp Asp Asp Leu Ile Ile Gly Leu Lys Gly Lys Glu Arg  
 165 170 175



Glu	Leu	Lys	Leu	Ala	Gly	Arg	Phe	Phe	Ser	Leu	Met	Ser	Trp	Lys	Leu	180	185	190	
Arg	Glu	Tyr	Phe	Val	Ile	Thr	Glu	Tyr	Leu	Ile	Lys	Thr	His	Phe	Val	195	200	205	
Pro	Met	Phe	Lys	Gly	Leu	Thr	Met	Ala	Asp	Asp	Leu	Thr	Ala	Val	Ile	210	215	220	
Lys	Lys	Met	Leu	Asp	Ser	Ser	Ser	Gly	Gln	Gly	Leu	Lys	Ser	Tyr	Glu	225	230	235	240
Ala	Ile	Cys	Ile	Ala	Asn	His	Ile	Asp	Tyr	Glu	Lys	Trp	Asn	Asn	His	245	250	255	
Gln	Arg	Lys	Leu	Ser	Asn	Gly	Pro	Val	Phe	Arg	Val	Met	Gly	Gln	Phe	260	265	270	
Leu	Gly	Tyr	Pro	Ser	Leu	Ile	Glu	Arg	Thr	His	Glu	Phe	Phe	Glu	Lys	275	280	285	
Ser	Leu	Ile	Tyr	Tyr	Asn	Gly	Arg	Pro	Asp	Leu	Met	Arg	Val	His	Asn	290	295	300	
Asn	Thr	Leu	Ile	Asn	Ser	Thr	Ser	Gln	Arg	Val	Cys	Trp	Gln	Gly	Gln	305	310	315	320
Glu	Gly	Gly	Leu	Glu	Gly	Leu	Arg	Gln	Lys	Gly	Trp	Ser	Ile	Leu	Asn	325	330	335	
Leu	Leu	Val	Ile	Gln	Arg	Glu	Ala	Lys	Ile	Arg	Asn	Thr	Ala	Val	Lys	340	345	350	
Val	Leu	Ala	Gln	Gly	Asp	Asn	Gln	Val	Ile	Cys	Thr	Gln	Tyr	Lys	Thr	355	360	365	
Lys	Lys	Ser	Arg	Asn	Val	Val	Glu	Leu	Gln	Gly	Ala	Leu	Asn	Gln	Met	370	375	380	
Val	Ser	Asn	Asn	Glu	Lys	Ile	Met	Thr	Ala	Ile	Lys	Ile	Gly	Thr	Gly	385	390	395	400
Lys	Leu	Gly	Leu	Leu	Ile	Asn	Asp	Asp	Glu	Thr	Met	Gln	Ser	Ala	Asp	405	410	415	
Tyr	Leu	Asn	Tyr	Gly	Lys	Ile	Pro	Ile	Phe	Arg	Gly	Val	Ile	Arg	Gly	420	425	430	
Leu	Glu	Thr	Lys	Arg	Trp	Ser	Arg	Val	Thr	Cys	Val	Thr	Asn	Asp	Gln	435	440	445	
Ile	Pro	Thr	Cys	Ala	Asn	Ile	Met	Ser	Ser	Val	Ser	Thr	Asn	Ala	Leu	450	455	460	
Thr	Val	Ala	His	Phe	Ala	Glu	Asn	Pro	Ile	Asn	Ala	Met	Ile	Gln	Tyr	465	470	475	480

Asn	Tyr	Phe	Gly	Thr	Phe	Ala	Arg	Leu	Leu	Leu	Met	Met	His	Asp	Pro		
				485					490					495			
Ala	Leu	Arg	Gln	Ser	Leu	Tyr	Glu	Val	Gln	Asp	Lys	Ile	Pro	Gly	Leu		
			500					505					510				
His	Ser	Ser	Thr	Phe	Lys	Tyr	Ala	Met	Leu	Tyr	Leu	Asp	Pro	Ser	Ile		
		515					520					525					
Gly	Gly	Val	Ser	Gly	Met	Ser	Leu	Ser	Arg	Phe	Leu	Ile	Arg	Ala	Phe		
	530					535					540						
Pro	Asp	Pro	Val	Thr	Glu	Ser	Leu	Ser	Phe	Trp	Arg	Phe	Ile	His	Val		
545					550					555					560		
His	Ala	Arg	Ser	Glu	His	Leu	Lys	Glu	Met	Ser	Ala	Val	Phe	Gly	Asn		
				565					570					575			
Pro	Glu	Ile	Ala	Lys	Phe	Arg	Ile	Thr	His	Ile	Asp	Lys	Leu	Val	Glu		
			580					585					590				
Asp	Pro	Thr	Ser	Leu	Asn	Ile	Ala	Met	Gly	Met	Ser	Pro	Ala	Asn	Leu		
		595					600					605					
Leu	Lys	Thr	Glu	Val	Lys	Lys	Cys	Leu	Ile	Glu	Ser	Arg	Gln	Thr	Ile		
	610					615					620						
Arg	Asn	Gln	Val	Ile	Lys	Asp	Ala	Thr	Ile	Tyr	Leu	Tyr	His	Glu	Glu		
625					630					635					640		
Asp	Arg	Leu	Arg	Ser	Phe	Leu	Trp	Ser	Ile	Asn	Pro	Leu	Phe	Pro	Arg		
				645					650					655			
Phe	Leu	Ser	Glu	Phe	Lys	Ser	Gly	Thr	Phe	Leu	Gly	Val	Ala	Asp	Gly		
		660						665						670			
Leu	Ile	Ser	Leu	Phe	Gln	Asn	Ser	Arg	Thr	Ile	Arg	Asn	Ser	Phe	Lys		
		675					680					685					
Lys	Lys	Tyr	His	Arg	Glu	Leu	Asp	Asp	Leu	Ile	Val	Arg	Ser	Glu	Val		
	690					695					700						
Ser	Ser	Leu	Thr	His	Leu	Gly	Lys	Leu	His	Leu	Arg	Arg	Gly	Ser	Cys		
705					710					715					720		
Lys	Met	Trp	Thr	Cys	Ser	Ala	Thr	His	Ala	Asp	Thr	Leu	Arg	Tyr	Lys		
				725					730					735			
Ser	Trp	Gly	Arg	Thr	Val	Ile	Gly	Thr	Thr	Val	Pro	His	Pro	Leu	Glu		
			740					745					750				
Met	Leu	Gly	Pro	Gln	His	Arg	Lys	Glu	Thr	Pro	Cys	Ala	Pro	Cys	Asn		
		755					760					765					
Thr	Ser	Gly	Phe	Asn	Tyr	Val	Ser	Val	His	Cys	Pro	Asp	Gly	Ile	His		
	770					775					780						

Asp	Val	Phe	Ser	Ser	Arg	Gly	Pro	Leu	Pro	Ala	Tyr	Leu	Gly	Ser	Lys	785	790	795	800
Thr	Ser	Glu	Ser	Thr	Ser	Ile	Leu	Gln	Pro	Trp	Glu	Arg	Glu	Ser	Lys	805	810	815	
Val	Pro	Leu	Ile	Lys	Arg	Ala	Thr	Arg	Leu	Arg	Asp	Ala	Ile	Ser	Trp	820	825	830	
Phe	Val	Glu	Pro	Asp	Ser	Lys	Leu	Ala	Met	Thr	Ile	Leu	Ser	Asn	Ile	835	840	845	
His	Ser	Leu	Thr	Gly	Glu	Glu	Trp	Thr	Lys	Arg	Gln	His	Gly	Phe	Lys	850	855	860	
Arg	Thr	Gly	Ser	Ala	Leu	His	Arg	Phe	Ser	Thr	Ser	Arg	Met	Ser	His	865	870	875	880
Gly	Gly	Phe	Ala	Ser	Gln	Ser	Thr	Ala	Ala	Leu	Thr	Arg	Leu	Met	Ala	885	890	895	
Thr	Thr	Asp	Thr	Met	Arg	Asp	Leu	Gly	Asp	Gln	Asn	Phe	Asp	Phe	Leu	900	905	910	
Phe	Gln	Ala	Thr	Leu	Leu	Tyr	Ala	Gln	Ile	Thr	Thr	Thr	Val	Ala	Arg	915	920	925	
Asp	Gly	Trp	Ile	Thr	Ser	Cys	Thr	Asp	His	Tyr	His	Ile	Ala	Cys	Lys	930	935	940	
Ser	Cys	Leu	Arg	Pro	Ile	Glu	Glu	Ile	Thr	Leu	Asp	Ser	Ser	Met	Asp	945	950	955	960
Tyr	Thr	Pro	Pro	Asp	Val	Ser	His	Val	Leu	Lys	Thr	Trp	Arg	Asn	Gly	965	970	975	
Glu	Gly	Ser	Trp	Gly	Gln	Glu	Ile	Lys	Gln	Ile	Tyr	Pro	Leu	Glu	Gly	980	985	990	
Asn	Trp	Lys	Asn	Leu	Ala	Pro	Ala	Glu	Gln	Ser	Tyr	Gln	Val	Gly	Arg	995	1000	1005	
Cys	Ile	Gly	Phe	Leu	Tyr	Gly	Asp	Leu	Ala	Tyr	Arg	Lys	Ser	Thr	His	1010	1015	1020	
Ala	Glu	Asp	Ser	Ser	Leu	Phe	Pro	Leu	Ser	Ile	Gln	Gly	Arg	Ile	Arg	1025	1030	1035	1040
Gly	Arg	Gly	Phe	Leu	Lys	Gly	Leu	Leu	Asp	Gly	Leu	Met	Arg	Ala	Ser	1045	1050	1055	
Cys	Cys	Gln	Val	Ile	His	Arg	Arg	Ser	Leu	Ala	His	Leu	Lys	Arg	Pro	1060	1065	1070	
Ala	Asn	Ala	Val	Tyr	Gly	Gly	Leu	Ile	Tyr	Leu	Ile	Asp	Lys	Leu	Ser	1075	1080	1085	

Val Ser Pro Pro Phe Leu Ser Leu Thr Arg Ser Gly Pro Ile Arg Asp  
 1090 1095 1100  
 Glu Leu Glu Thr Ile Pro His Lys Ile Pro Thr Ser Tyr Pro Thr Ser  
 1105 1110 1115 1120  
 Asn Arg Asp Met Gly Val Ile Val Arg Asn Tyr Phe Lys Tyr Gln Cys  
 1125 1130 1135  
 Arg Leu Ile Glu Lys Gly Lys Tyr Arg Ser His Tyr Ser Gln Leu Trp  
 1140 1145 1150  
 Leu Phe Ser Asp Val Leu Ser Ile Asp Phe Ile Gly Pro Phe Ser Ile  
 1155 1160 1165  
 Ser Thr Thr Leu Leu Gln Ile Leu Tyr Lys Pro Phe Leu Ser Gly Lys  
 1170 1175 1180  
 Asp Lys Asn Glu Leu Arg Glu Leu Ala Asn Leu Ser Ser Leu Leu Arg  
 1185 1190 1195 1200  
 Ser Gly Glu Gly Trp Glu Asp Ile His Val Lys Phe Phe Thr Lys Asp  
 1205 1210 1215  
 Ile Leu Leu Cys Pro Glu Glu Ile Arg His Ala Cys Lys Phe Gly Ile  
 1220 1225 1230  
 Ala Lys Asp Asn Asn Lys Asp Met Ser Tyr Pro Pro Trp Gly Arg Glu  
 1235 1240 1245  
 Ser Arg Gly Thr Ile Thr Thr Ile Pro Val Tyr Tyr Thr Thr Thr Pro  
 1250 1255 1260  
 Tyr Pro Lys Met Leu Glu Met Pro Pro Arg Ile Gln Asn Pro Leu Leu  
 1265 1270 1275 1280  
 Ser Gly Ile Arg Leu Gly Gln Leu Pro Thr Gly Ala His Tyr Lys Ile  
 1285 1290 1295  
 Arg Ser Ile Leu His Gly Met Gly Ile His Tyr Arg Asp Phe Leu Ser  
 1300 1305 1310  
 Cys Gly Asp Gly Ser Gly Gly Met Thr Ala Ala Leu Leu Arg Glu Asn  
 1315 1320 1325  
 Val His Ser Arg Gly Ile Phe Asn Ser Leu Leu Glu Leu Ser Gly Ser  
 1330 1335 1340  
 Val Met Arg Gly Ala Ser Pro Glu Pro Pro Ser Ala Leu Glu Thr Leu  
 1345 1350 1355 1360  
 Gly Gly Asp Lys Ser Arg Cys Val Asn Gly Glu Thr Cys Trp Glu Tyr  
 1365 1370 1375  
 Pro Ser Asp Leu Cys Asp Pro Arg Thr Trp Asp Tyr Phe Leu Arg Leu  
 1380 1385 1390

Lys Ala Gly Leu Gly Leu Gln Ile Asp Leu Ile Val Met Asp Met Glu  
 1395 1400 1405  
 Val Arg Asp Ser Ser Thr Ser Leu Lys Ile Glu Thr Asn Val Arg Asn  
 1410 1415 1420  
 Tyr Val His Arg Ile Leu Asp Glu Gln Gly Val Leu Ile Tyr Lys Thr  
 1425 1430 1435 1440  
 Tyr Gly Thr Tyr Ile Cys Glu Ser Glu Lys Asn Ala Val Thr Ile Leu  
 1445 1450 1455  
 Gly Pro Met Phe Lys Thr Val Asp Leu Val Gln Thr Glu Phe Ser Ser  
 1460 1465 1470  
 Ser Gln Thr Ser Glu Val Tyr Met Val Cys Lys Gly Leu Lys Lys Leu  
 1475 1480 1485  
 Ile Asp Glu Pro Asn Pro Asp Trp Ser Ser Ile Asn Glu Ser Trp Lys  
 1490 1495 1500  
 Asn Leu Tyr Ala Phe Gln Ser Ser Glu Gln Glu Phe Ala Arg Ala Lys  
 1505 1510 1515 1520  
 Lys Val Ser Thr Tyr Phe Thr Leu Thr Gly Ile Pro Ser Gln Phe Ile  
 1525 1530 1535  
 Pro Asp Pro Phe Val Asn Ile Glu Thr Met Leu Gln Ile Phe Gly Val  
 1540 1545 1550  
 Pro Thr Gly Val Ser His Ala Ala Ala Leu Lys Ser Ser Asp Arg Pro  
 1555 1560 1565  
 Ala Asp Leu Leu Thr Ile Ser Leu Phe Tyr Met Ala Ile Ile Ser Tyr  
 1570 1575 1580  
 Tyr Asn Ile Asn His Ile Arg Val Gly Pro Ile Pro Pro Asn Pro Pro  
 1585 1590 1595 1600  
 Ser Asp Gly Ile Ala Gln Asn Val Gly Ile Ala Ile Thr Gly Ile Ser  
 1605 1610 1615  
 Phe Trp Leu Ser Leu Met Glu Lys Asp Ile Pro Leu Tyr Gln Gln Cys  
 1620 1625 1630  
 Leu Ala Val Ile Gln Gln Ser Phe Pro Ile Arg Trp Glu Ala Val Ser  
 1635 1640 1645  
 Val Lys Gly Gly Tyr Lys Gln Lys Trp Ser Thr Arg Gly Asp Gly Leu  
 1650 1655 1660  
 Pro Lys Asp Thr Arg Ile Ser Asp Ser Leu Ala Pro Ile Gly Asn Trp  
 1665 1670 1675 1680  
 Ile Arg Ser Leu Glu Leu Val Arg Asn Gln Val Arg Leu Asn Pro Phe  
 1685 1690 1695

Asn Glu Ile Leu Phe Asn Gln Leu Cys Arg Thr Val Asp Asn His Leu  
                   1700                                  1705                                  1710  
 Lys Trp Ser Asn Leu Arg Lys Asn Thr Gly Met Ile Glu Trp Ile Asn  
                   1715                                  1720                                  1725  
 Arg Arg Ile Ser Lys Glu Asp Arg Ser Ile Leu Met Leu Lys Ser Asp  
                   1730                                  1735                                  1740  
 Leu His Glu Glu Asn Ser Trp Arg Asp  
 1745                                  1750

<210> 52  
 <211> 2109  
 <212> PRT  
 <213> Vesicular stomatitis virus

<220>  
 <221> MOD\_RES  
 <222> (1)..(2109)  
 <223> "Xaa" represents any, other or unknown amino acid

<400> 52  
 Met Glu Val His Asp Phe Glu Thr Asp Glu Phe Asn Asp Phe Asn Glu  
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 Asp Asp Tyr Ala Thr Arg Glu Phe Leu Asn Pro Asp Glu Arg Met Thr  
                   20                                  25                                  30  
 Tyr Leu Asn His Ala Asp Tyr Asn Leu Asn Ser Pro Leu Ile Ser Asp  
                   35                                  40                                  45  
 Asp Ile Asp Asn Leu Ile Arg Lys Phe Asn Ser Leu Pro Ile Pro Ser  
   50                                  55                                  60  
 Met Trp Asp Ser Lys Asn Trp Asp Gly Val Leu Glu Met Leu Thr Ser  
   65                                  70                                  75                                  80  
 Cys Gln Ala Asn Pro Ile Ser Thr Ser Gln Met His Lys Trp Met Gly  
                   85                                  90                                  95  
 Ser Trp Leu Met Ser Asp Asn His Asp Ala Ser Gln Gly Tyr Ser Phe  
                   100                                  105                                  110  
 Leu His Glu Val Asp Lys Glu Ala Glu Ile Thr Phe Asp Val Val Glu  
                   115                                  120                                  125  
 Thr Phe Ile Arg Gly Trp Gly Asn Lys Pro Ile Glu Tyr Ile Lys Lys  
                   130                                  135                                  140  
 Glu Arg Trp Thr Asp Ser Phe Lys Ile Leu Ala Tyr Leu Cys Gln Lys  
 145                                  150                                  155                                  160  
 Phe Leu Asp Leu His Lys Leu Thr Leu Ile Leu Asn Ala Val Ser Glu  
                   165                                  170                                  175

Val	Glu	Leu	Leu	Asn	Leu	Ala	Arg	Thr	Phe	Lys	Gly	Lys	Val	Arg	Arg		
			180					185					190				
Ser	Ser	His	Gly	Thr	Asn	Ile	Cys	Arg	Leu	Arg	Val	Pro	Ser	Leu	Gly		
		195					200					205					
Pro	Thr	Phe	Ile	Ser	Glu	Gly	Trp	Ala	Tyr	Phe	Lys	Lys	Leu	Asp	Ile		
	210					215					220						
Leu	Met	Asp	Arg	Asn	Phe	Leu	Leu	Met	Val	Lys	Asp	Val	Ile	Ile	Gly		
225					230					235					240		
Arg	Met	Gln	Thr	Val	Leu	Ser	Met	Val	Cys	Arg	Ile	Asp	Asn	Leu	Phe		
			245						250					255			
Ser	Glu	Gln	Asp	Ile	Phe	Ser	Leu	Leu	Asn	Ile	Tyr	Arg	Ile	Gly	Asp		
			260					265					270				
Lys	Ile	Val	Glu	Arg	Gln	Gly	Asn	Phe	Ser	Tyr	Asp	Leu	Ile	Lys	Met		
	275						280					285					
Val	Glu	Pro	Ile	Cys	Asn	Leu	Arg	Leu	Met	Lys	Leu	Ala	Arg	Glu	Ser		
	290					295					300						
Arg	Pro	Leu	Val	Pro	Gln	Phe	Pro	His	Phe	Glu	Asn	His	Ile	Lys	Thr		
305					310					315					320		
Ser	Val	Asp	Glu	Gly	Ala	Lys	Ile	Asp	Arg	Gly	Ile	Arg	Phe	Leu	His		
				325					330					335			
Asp	Gln	Ile	Met	Ser	Val	Lys	Thr	Val	Asp	Leu	Thr	Leu	Val	Ile	Tyr		
		340						345					350				
Gly	Ser	Phe	Arg	His	Trp	Gly	His	Pro	Phe	Ile	Asp	Tyr	Tyr	Ala	Gly		
		355				360						365					
Leu	Glu	Lys	Leu	His	Ser	Gln	Val	Thr	Met	Lys	Lys	Asp	Ile	Asp	Val		
	370					375					380						
Ser	Tyr	Ala	Lys	Ala	Leu	Ala	Ser	Asp	Leu	Ala	Arg	Ile	Val	Leu	Phe		
385					390				395					400			
Gln	Gln	Phe	Asn	Asp	His	Lys	Lys	Trp	Phe	Val	Asn	Gly	Asp	Leu	Leu		
			405						410					415			
Pro	His	Asp	His	Pro	Phe	Lys	Ser	His	Val	Lys	Glu	Asn	Thr	Trp	Pro		
			420					425					430				
Thr	Ala	Ala	Gln	Val	Gln	Asp	Phe	Gly	Asp	Lys	Trp	His	Glu	Leu	Pro		
	435						440					445					
Leu	Ile	Lys	Cys	Phe	Glu	Ile	Pro	Asp	Leu	Leu	Asp	Pro	Ser	Ile	Ile		
	450					455					460						
Tyr	Ser	Asp	Lys	Ser	His	Ser	Met	Asn	Arg	Ser	Glu	Val	Leu	Lys	His		
465					470					475					480		

Val	Arg	Met	Asn	Pro	Asn	Thr	Pro	Ile	Pro	Ser	Lys	Lys	Val	Leu	Gln	485	490	495
Thr	Met	Leu	Asp	Thr	Lys	Ala	Thr	Asn	Trp	Lys	Glu	Phe	Leu	Lys	Glu	500	505	510
Ile	Asp	Glu	Lys	Gly	Leu	Asp	Asp	Asp	Asp	Leu	Ile	Ile	Gly	Leu	Lys	515	520	525
Gly	Lys	Glu	Arg	Glu	Leu	Lys	Leu	Ala	Gly	Arg	Phe	Phe	Ser	Leu	Met	530	535	540
Ser	Trp	Lys	Leu	Arg	Glu	Tyr	Phe	Val	Ile	Thr	Glu	Tyr	Leu	Ile	Lys	545	550	555
Thr	His	Phe	Val	Pro	Met	Phe	Lys	Gly	Leu	Thr	Met	Ala	Asp	Asp	Leu	565	570	575
Thr	Ala	Val	Ile	Lys	Lys	Met	Leu	Asp	Ser	Ser	Ser	Gly	Gln	Gly	Leu	580	585	590
Lys	Ser	Tyr	Glu	Ala	Ile	Cys	Ile	Ala	Asn	His	Ile	Asp	Tyr	Glu	Lys	595	600	605
Trp	Asn	Asn	His	Gln	Arg	Lys	Leu	Ser	Asn	Gly	Pro	Val	Phe	Arg	Val	610	615	620
Met	Gly	Gln	Phe	Leu	Gly	Tyr	Pro	Ser	Leu	Ile	Glu	Arg	Thr	His	Glu	625	630	635
Phe	Phe	Glu	Lys	Ser	Leu	Ile	Tyr	Tyr	Asn	Gly	Arg	Pro	Asp	Leu	Met	645	650	655
Arg	Val	His	Asn	Asn	Thr	Leu	Ile	Asn	Ser	Thr	Ser	Gln	Arg	Val	Cys	660	665	670
Trp	Gln	Gly	Gln	Glu	Gly	Gly	Leu	Glu	Gly	Leu	Arg	Gln	Lys	Gly	Trp	675	680	685
Ser	Ile	Leu	Asn	Leu	Leu	Val	Ile	Gln	Arg	Glu	Ala	Lys	Ile	Arg	Asn	690	695	700
Thr	Ala	Val	Lys	Val	Leu	Ala	Gln	Gly	Asp	Asn	Gln	Val	Ile	Cys	Thr	705	710	715
Gln	Tyr	Lys	Thr	Lys	Lys	Ser	Arg	Asn	Val	Val	Glu	Leu	Gln	Gly	Ala	725	730	735
Leu	Asn	Gln	Met	Val	Ser	Asn	Asn	Glu	Lys	Ile	Met	Thr	Ala	Ile	Lys	740	745	750
Ile	Gly	Thr	Gly	Lys	Leu	Gly	Leu	Leu	Ile	Asn	Asp	Asp	Glu	Thr	Met	755	760	765
Gln	Ser	Ala	Asp	Tyr	Leu	Asn	Tyr	Gly	Lys	Ile	Pro	Ile	Phe	Arg	Gly	770	775	780



Val	Ile	Arg	Gly	Leu	Glu	Thr	Lys	Arg	Trp	Ser	Arg	Val	Thr	Cys	Val	
785					790					795					800	
Thr	Asn	Asp	Gln	Ile	Pro	Thr	Cys	Ala	Asn	Ile	Met	Ser	Ser	Val	Ser	
			805						810					815		
Thr	Asn	Ala	Leu	Thr	Val	Ala	His	Phe	Ala	Glu	Asn	Pro	Ile	Asn	Ala	
		820						825					830			
Met	Ile	Gln	Tyr	Asn	Tyr	Phe	Gly	Thr	Phe	Ala	Arg	Leu	Leu	Leu	Met	
	835						840					845				
Met	His	Asp	Pro	Ala	Leu	Arg	Gln	Ser	Leu	Tyr	Glu	Val	Gln	Asp	Lys	
	850					855					860					
Ile	Pro	Gly	Leu	His	Ser	Ser	Thr	Phe	Lys	Tyr	Ala	Met	Leu	Tyr	Leu	
865				870						875					880	
Asp	Pro	Ser	Ile	Gly	Gly	Val	Ser	Gly	Met	Ser	Leu	Ser	Arg	Phe	Leu	
			885					890						895		
Ile	Arg	Ala	Phe	Pro	Asp	Pro	Val	Thr	Glu	Ser	Leu	Ser	Phe	Trp	Arg	
		900						905					910			
Phe	Ile	His	Val	His	Ala	Arg	Ser	Glu	His	Leu	Lys	Glu	Met	Ser	Ala	
	915					920					925					
Val	Phe	Gly	Asn	Pro	Glu	Ile	Ala	Lys	Phe	Arg	Ile	Thr	His	Ile	Asp	
	930					935					940					
Lys	Leu	Val	Glu	Asp	Pro	Thr	Ser	Leu	Asn	Ile	Ala	Met	Gly	Met	Ser	
945				950					955						960	
Pro	Ala	Asn	Leu	Leu	Lys	Thr	Glu	Val	Lys	Lys	Cys	Leu	Ile	Glu	Ser	
			965						970					975		
Arg	Gln	Thr	Ile	Arg	Asn	Gln	Val	Ile	Lys	Asp	Ala	Thr	Ile	Tyr	Leu	
		980						985					990			
Tyr	His	Glu	Glu	Asp	Arg	Leu	Arg	Ser	Phe	Leu	Trp	Ser	Ile	Asn	Pro	
	995					1000						1005				
Leu	Phe	Pro	Arg	Phe	Leu	Ser	Glu	Phe	Lys	Ser	Gly	Thr	Phe	Leu	Gly	
	1010				1015						1020					
Val	Ala	Asp	Gly	Leu	Ile	Ser	Leu	Phe	Gln	Asn	Ser	Arg	Thr	Ile	Arg	
1025				1030					1035					1040		
Asn	Ser	Phe	Lys	Lys	Lys	Tyr	His	Arg	Glu	Leu	Asp	Asp	Leu	Ile	Val	
		1045						1050					1055			
Arg	Ser	Glu	Val	Ser	Ser	Leu	Thr	His	Leu	Gly	Lys	Leu	His	Leu	Arg	
		1060					1065						1070			
Arg	Gly	Ser	Cys	Lys	Met	Trp	Thr	Cys	Ser	Ala	Thr	His	Ala	Asp	Thr	
	1075					1080						1085				

Leu Arg Tyr Lys Ser Trp Gly Arg Thr Val Ile Gly Thr Thr Val Pro  
 1090 1095 1100  
 His Pro Leu Glu Met Leu Gly Pro Gln His Arg Lys Glu Thr Pro Cys  
 1105 1110 1115 1120  
 Ala Pro Cys Asn Thr Ser Gly Phe Asn Tyr Val Ser Val His Cys Pro  
 1125 1130 1135  
 Asp Gly Ile His Asp Val Phe Ser Ser Arg Gly Pro Leu Pro Ala Tyr  
 1140 1145 1150  
 Leu Gly Ser Lys Thr Ser Glu Ser Thr Ser Ile Leu Gln Pro Trp Glu  
 1155 1160 1165  
 Arg Glu Ser Lys Val Pro Leu Ile Lys Arg Ala Thr Arg Leu Arg Asp  
 1170 1175 1180  
 Ala Ile Ser Trp Phe Val Glu Pro Asp Ser Lys Leu Ala Met Thr Ile  
 1185 1190 1195 1200  
 Leu Ser Asn Ile His Ser Leu Thr Gly Glu Glu Trp Thr Lys Arg Gln  
 1205 1210 1215  
 His Gly Phe Lys Arg Thr Gly Ser Ala Leu His Arg Phe Ser Thr Ser  
 1220 1225 1230  
 Arg Met Ser His Gly Gly Phe Ala Ser Gln Ser Thr Ala Ala Leu Thr  
 1235 1240 1245  
 Arg Leu Met Ala Thr Thr Asp Thr Met Arg Asp Leu Gly Asp Gln Asn  
 1250 1255 1260  
 Phe Asp Phe Leu Phe Xaa Ala Thr Leu Leu Tyr Ala Xaa Ile Thr Thr  
 1265 1270 1275 1280  
 Thr Val Ala Arg Asp Gly Trp Ile Thr Ser Cys Thr Asp His Tyr His  
 1285 1290 1295  
 Ile Ala Cys Lys Ser Cys Leu Arg Pro Ile Glu Glu Ile Thr Leu Asp  
 1300 1305 1310  
 Ser Ser Met Asp Tyr Thr Pro Pro Asp Val Ser His Val Leu Lys Thr  
 1315 1320 1325  
 Trp Arg Asn Gly Glu Gly Ser Trp Gly Gln Glu Ile Lys Gln Ile Tyr  
 1330 1335 1340  
 Pro Leu Glu Gly Asn Trp Lys Asn Leu Ala Pro Ala Glu Gln Ser Tyr  
 1345 1350 1355 1360  
 Gln Val Gly Arg Cys Ile Gly Phe Leu Tyr Gly Asp Leu Ala Tyr Arg  
 1365 1370 1375  
 Lys Ser Thr His Ala Glu Asp Ser Ser Leu Phe Pro Leu Ser Ile Gln  
 1380 1385 1390

Gly Arg Ile Arg Gly Arg Gly Phe Leu Lys Gly Leu Leu Asp Gly Leu  
 1395 1400 1405  
 Met Arg Ala Ser Cys Cys Gln Val Ile His Arg Arg Ser Leu Ala His  
 1410 1415 1420  
 Leu Lys Arg Pro Ala Asn Ala Val Tyr Gly Gly Leu Ile Tyr Leu Ile  
 1425 1430 1435 1440  
 Asp Lys Leu Ser Val Ser Pro Pro Phe Leu Ser Leu Thr Arg Ser Gly  
 1445 1450 1455  
 Pro Ile Arg Asp Glu Leu Glu Thr Ile Pro His Lys Ile Pro Thr Ser  
 1460 1465 1470  
 Tyr Pro Thr Ser Asn Arg Asp Met Gly Val Ile Val Arg Asn Tyr Phe  
 1475 1480 1485  
 Lys Tyr Gln Cys Arg Leu Ile Glu Lys Gly Lys Tyr Arg Ser His Tyr  
 1490 1495 1500  
 Ser Gln Leu Trp Leu Phe Ser Asp Val Leu Ser Ile Asp Phe Ile Gly  
 1505 1510 1515 1520  
 Pro Phe Ser Ile Ser Thr Thr Leu Leu Gln Ile Leu Tyr Lys Pro Phe  
 1525 1530 1535  
 Leu Ser Gly Lys Asp Lys Asn Glu Leu Arg Glu Leu Ala Asn Leu Ser  
 1540 1545 1550  
 Ser Leu Leu Arg Ser Gly Glu Gly Trp Glu Asp Ile His Val Lys Phe  
 1555 1560 1565  
 Phe Thr Lys Asp Ile Leu Leu Cys Pro Glu Glu Ile Arg His Ala Cys  
 1570 1575 1580  
 Lys Phe Gly Ile Ala Lys Asp Asn Asn Lys Asp Met Ser Tyr Pro Pro  
 1585 1590 1595 1600  
 Trp Gly Arg Glu Ser Arg Gly Thr Ile Thr Thr Ile Pro Val Tyr Tyr  
 1605 1610 1615  
 Thr Thr Thr Pro Tyr Pro Lys Met Leu Glu Met Pro Pro Arg Ile Gln  
 1620 1625 1630  
 Asn Pro Leu Leu Ser Gly Ile Arg Leu Gly Gln Leu Pro Thr Gly Ala  
 1635 1640 1645  
 His Tyr Lys Ile Arg Ser Ile Leu His Gly Met Gly Ile His Tyr Arg  
 1650 1655 1660  
 Asp Phe Leu Ser Cys Gly Asp Gly Ser Gly Gly Met Thr Ala Ala Leu  
 1665 1670 1675 1680  
 Leu Arg Glu Asn Val His Ser Arg Gly Ile Phe Asn Ser Leu Leu Glu  
 1685 1690 1695

Leu Ser Gly Ser Val Met Arg Gly Ala Ser Pro Glu Pro Pro Ser Ala  
 1700 1705 1710

Leu Glu Thr Leu Gly Gly Asp Lys Ser Arg Cys Val Asn Gly Glu Thr  
 1715 1720 1725

Cys Trp Glu Tyr Pro Ser Asp Leu Cys Asp Pro Arg Thr Trp Asp Tyr  
 1730 1735 1740

Phe Leu Arg Leu Lys Ala Gly Leu Gly Leu Gln Ile Asp Leu Ile Val  
 1745 1750 1755 1760

Met Asp Met Glu Val Arg Asp Ser Ser Thr Ser Leu Lys Ile Glu Thr  
 1765 1770 1775

Asn Val Arg Asn Tyr Val His Arg Ile Leu Asp Glu Gln Gly Val Leu  
 1780 1785 1790

Ile Tyr Lys Thr Tyr Gly Thr Tyr Ile Cys Glu Ser Glu Lys Asn Ala  
 1795 1800 1805

Val Thr Ile Leu Gly Pro Met Phe Lys Thr Val Asp Leu Val Gln Thr  
 1810 1815 1820

Glu Phe Ser Ser Ser Gln Thr Ser Glu Val Tyr Met Val Cys Lys Gly  
 1825 1830 1835 1840

Leu Lys Lys Leu Ile Asp Glu Pro Asn Pro Asp Trp Ser Ser Ile Asn  
 1845 1850 1855

Glu Ser Trp Lys Asn Leu Tyr Ala Phe Gln Ser Ser Glu Gln Glu Phe  
 1860 1865 1870

Ala Arg Ala Lys Lys Val Ser Thr Tyr Phe Thr Leu Thr Gly Ile Pro  
 1875 1880 1885

Ser Gln Phe Ile Pro Asp Pro Phe Val Asn Ile Glu Thr Met Leu Gln  
 1890 1895 1900

Ile Phe Gly Val Pro Thr Gly Val Ser His Ala Ala Ala Leu Lys Ser  
 1905 1910 1915 1920

Ser Asp Arg Pro Ala Asp Leu Leu Thr Ile Ser Leu Phe Tyr Met Ala  
 1925 1930 1935

Ile Ile Ser Tyr Tyr Asn Ile Asn His Ile Arg Val Gly Pro Ile Pro  
 1940 1945 1950

Pro Asn Pro Pro Ser Asp Gly Ile Ala Gln Asn Val Gly Ile Ala Ile  
 1955 1960 1965

Thr Gly Ile Ser Phe Trp Leu Ser Leu Met Glu Lys Asp Ile Pro Leu  
 1970 1975 1980

Tyr Gln Gln Cys Leu Ala Val Ile Gln Gln Ser Phe Pro Ile Arg Trp  
 1985 1990 1995 2000

Glu Ala Val Ser Val Lys Gly Gly Tyr Lys Gln Lys Trp Ser Thr Arg  
2005 2010 2015

Gly Asp Gly Leu Pro Lys Asp Thr Arg Ile Ser Asp Ser Leu Ala Pro  
2020 2025 2030

Ile Gly Asn Trp Ile Arg Ser Leu Glu Leu Val Arg Asn Gln Val Arg  
2035 2040 2045

Leu Asn Pro Phe Asn Glu Ile Leu Phe Asn Gln Leu Cys Arg Thr Val  
2050 2055 2060

Asp Asn His Leu Lys Trp Ser Asn Leu Arg Lys Asn Thr Gly Met Ile  
2065 2070 2075 2080

Glu Trp Ile Asn Arg Arg Ile Ser Lys Glu Asp Arg Ser Ile Leu Met  
2085 2090 2095

Leu Lys Ser Asp Leu His Glu Glu Asn Ser Trp Arg Asp  
2100 2105